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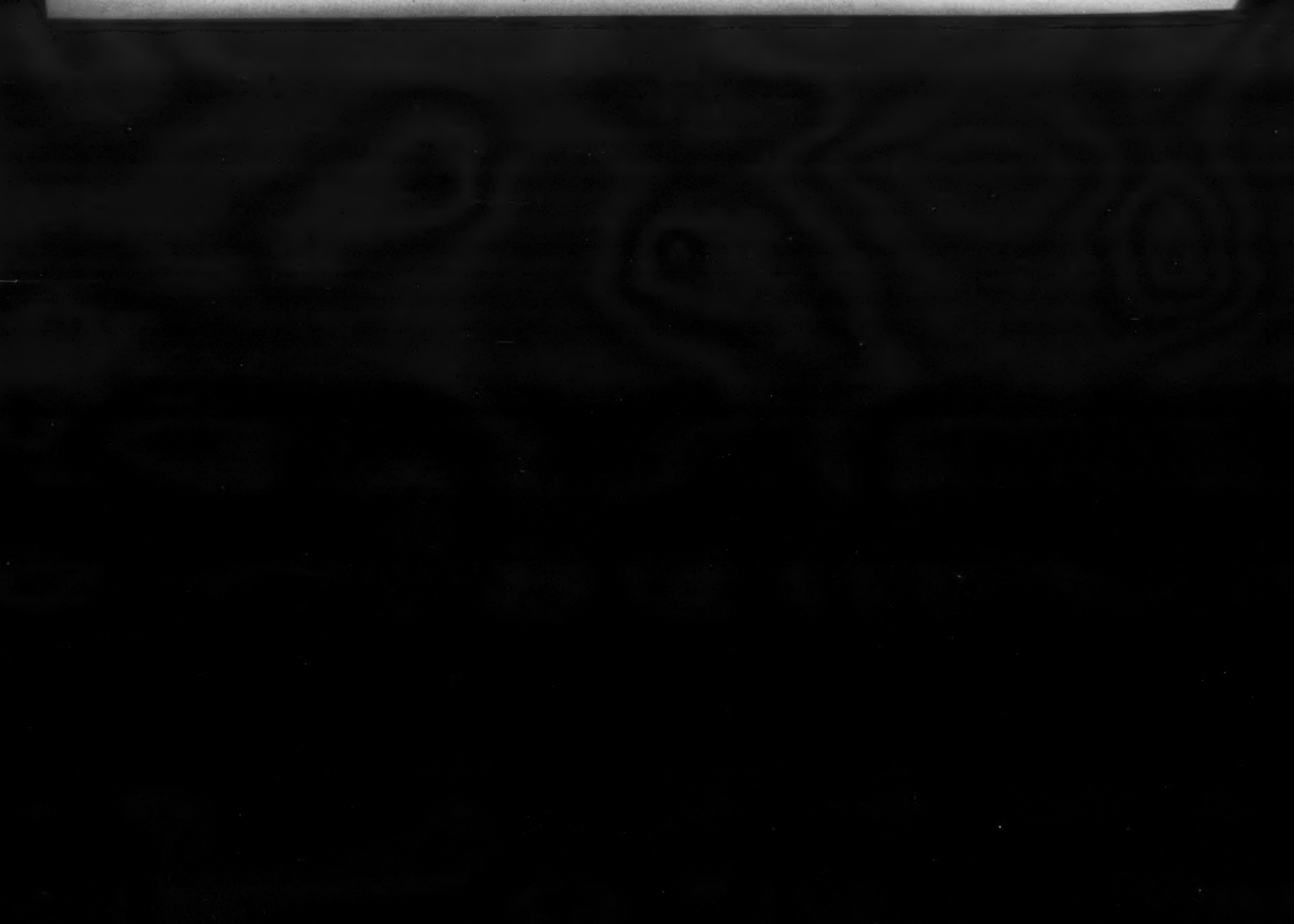

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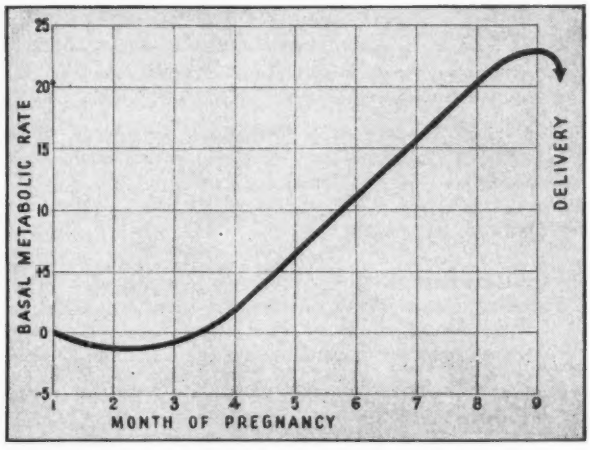

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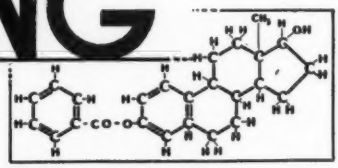

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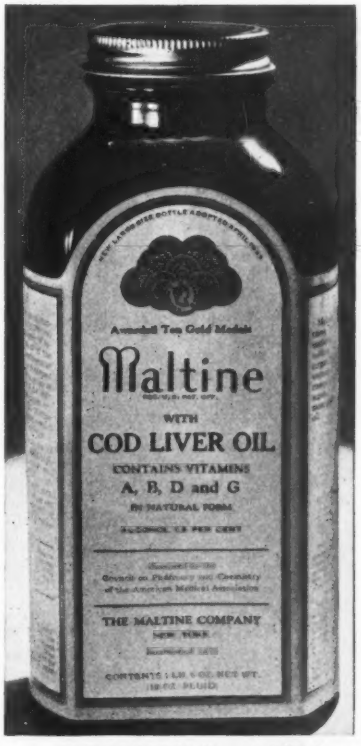

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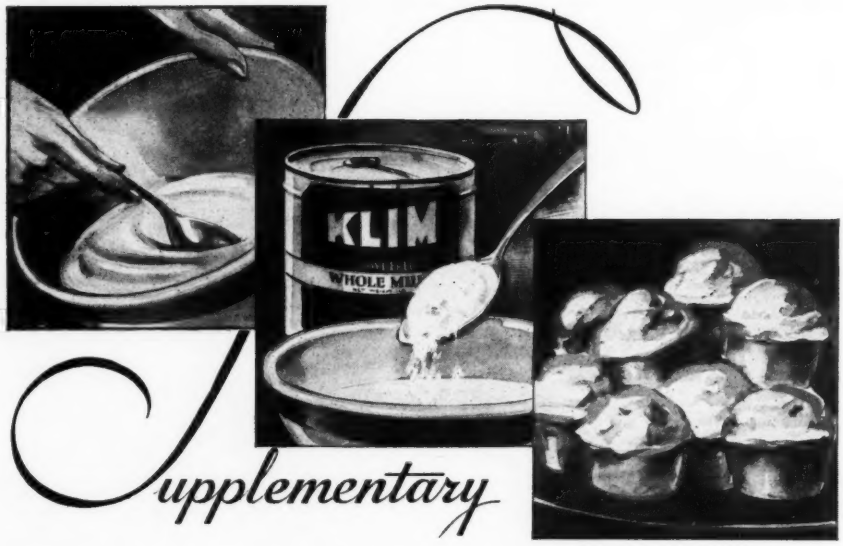

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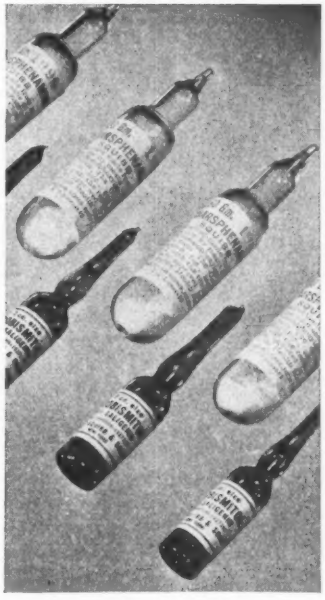

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*Holt, Tidwell and Kirk, Studies on Fat Metabolism in Infants—Acta Pediatrica, Vol. XVI, 1933.

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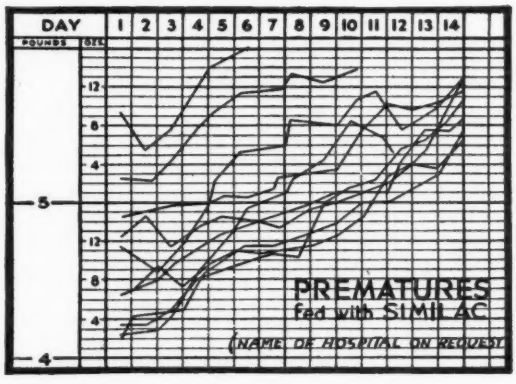

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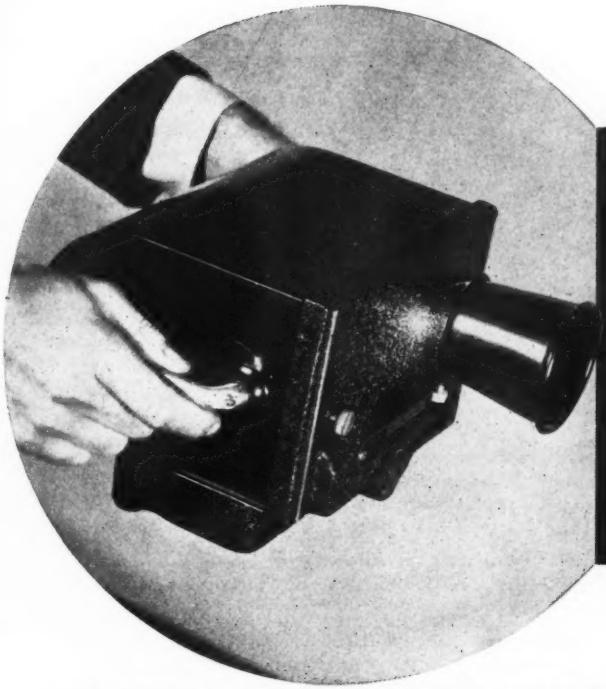

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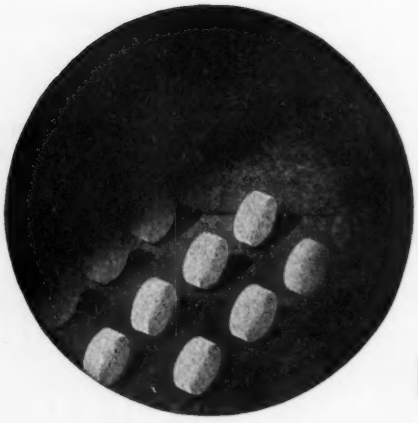

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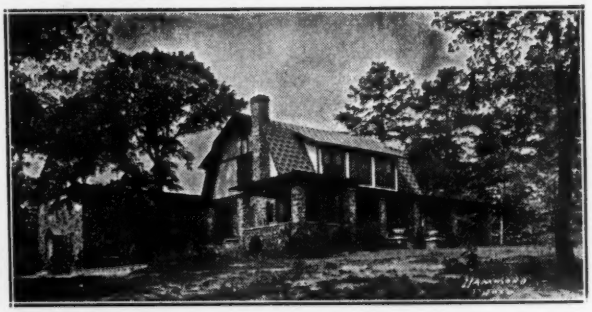

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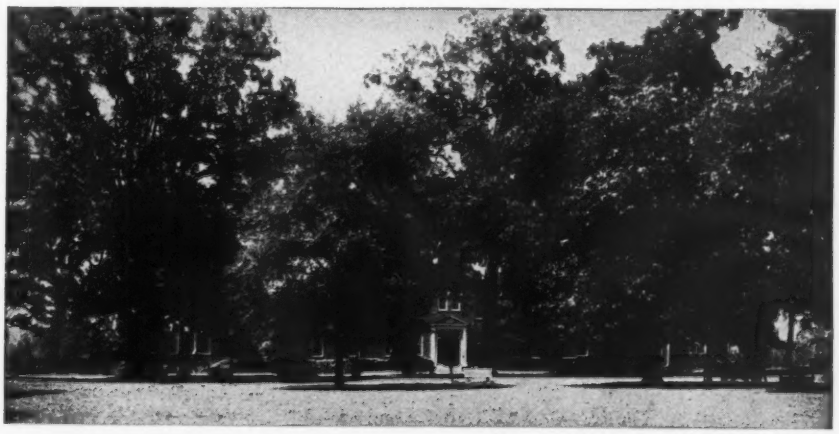

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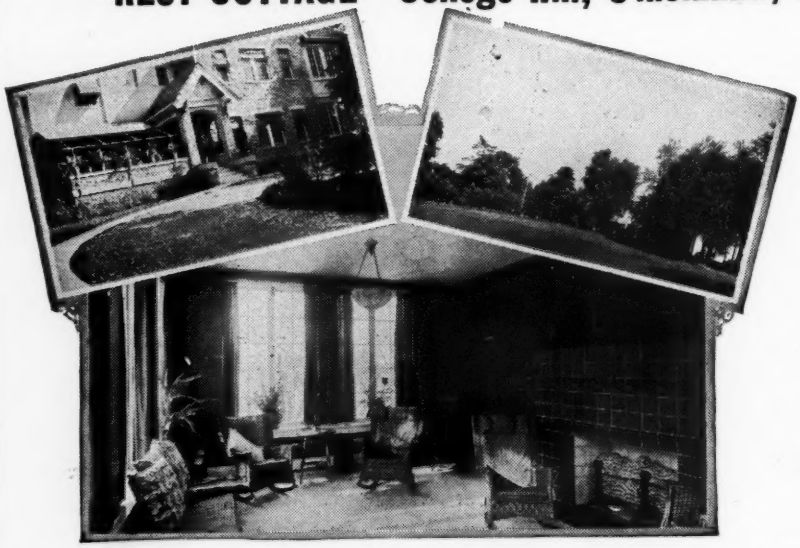

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Volume 29 FEBRUARY 1936 Number 2

HYALINE MEMBRANES UPON THE POSTERIOR SURFACE OF THE CORNEA WITH SPECIAL REFERENCE TO THE CONGENITAL TYPES*

By C. A. CLAPP, M.D.,
Baltimore, Maryland

Hyaline or glassy membranes upon the posterior surface of the cornea following inflammatory lesions are rare but still more rare are those which are congenital. I wish to report a case of the latter which I believe is the first in American literature and to review briefly the literature and comment on the theories that have been advanced as to the etiology.

The first case mentioned in the literature which might have been of this type was in 1908 by Stephenson[1]. This case occurred in a baby 5 months of age whose right eye had been unusual since birth. Examination revealed a small oval pupil in the upper nasal quadrant and a strip of light blue tissue above and nasally to the pupil which might have been on the anterior surface of the iris or perhaps on the posterior surface of the cornea. This case, judging from the description and illustration, cannot readily be classed with the one to be reported, although it was undoubtedly of congenital origin.

Coats[2] described in detail a case of bilateral microphthalmia in a child that lived but six days. In this case there was a loose membrane upon the anterior surface of the iris which was adherent to the cornea. His illustrations were all from macro and microscopic preparations so that it is difficult to judge how closely this case compared with subsequent reported cases, but it certainly was not identical.

Ballantyne[3] in 1933 reported a case in a child six days of age. This child had a small coloboma of the lid and two limbal dermoids, with three bands of tissue extending across the anterior chamber, the lower one being adherent to the cornea. While this case presents an interesting congenital anomaly and may be an allied condition, it certainly does not come under the classification of a hyaline membrane upon the posterior surface of the cornea.

Mann[4], however, reported three cases, the first two of which were so similar to the case here reported that there is no question of the similarity. Case 1 (*Figure 1*) was found in the left eye of a man of 29 who had a slight injury to his right eye and the abnormality of the left was noticed at that time. The cornea was slightly smaller than the right and the center of the cornea was clear, but the periphery was covered on its posterior surface by a semi-transparent membrane throughout most of its circumference. Thick coarse brown strands were present in the superficial layers of the iris. Case 2 (*Figures 2* and *3*) occurred in a girl 8 years of age who had subnormal vision in each eye. The hyaline membrane was around the lower two-thirds of the periphery of the right cornea. Coarse strands were on the surface of the iris. Hyaline tissue completely surrounded the left cornea, although it was quite narrow in places. The strands of iris stroma were similar to those found in the right eye. In Case 3, the hyaline membrane was not continuously adherent to the cornea and no change in iris tissue was found.

Rieger[5] in the April number of this year's *Archiv für Ophthalmologie* reported two cases, the second of which could, from his description and illustrations, fall into this group, although it is not a strikingly similar case.

CASE REPORT

The case here reported occurred in a man of 36 years.

The family history was negative as to ocular defects.

Sixteen years previously the patient suffered from an attack of cerebrospinal meningitis, but he had no eye complication at that time. Six years previously he

*Read in Section on Ophthalmology and Otolaryngology, Southern Medical Association, Twenty-Ninth Annual Meeting, St. Louis, Missouri, November 19-22, 1935.

*From the Wilmer Ophthalmological Institute of the Johns Hopkins University and Hospital.

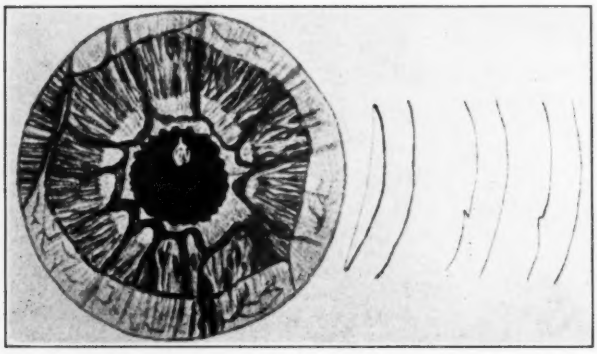

Fig. 1

(Mann) Hyaline membrane on posterior surface of cornea in a man 29 years of age. (From the *British Journal of Ophthalmology.*)

had infective arthritis in the right knee. Otherwise his general health had been good. The patient had always known that the vision of his left eye was poor, but thought his right eye was normal. He had worn glasses for six years, but had recently lost his glasses and came for new ones.

Upon external examination, the left eye was observed to turn out 30 degrees and up 5 degrees. Extra-ocular movements were normal; the left eye was smaller than the right. The right cornea measured 10 mm. in the horizontal meridian and 9 mm. in the vertical; the left 8.5 in the horizontal and 8 mm. in the vertical meridian. The right cornea was clear in its central portion, but around its periphery was a semi-transparent clouding. *Fig. 4* shows a stereoscopic photograph of the eye and *Fig. 5* is a photograph of the artist's drawing of the same eye. The iris seemed to have normal motility, but several thickened bands were present upon the superficial surface of the iris which seemed to be identical with those mentioned in Mann's cases. At the nasal side some of these bands came forward like a pillar and touched the membrane upon its posterior surface; a few were not attached anteriorly, but waved free in the aqueous.

Vision was:

O.D. 20/40+1.75 = —2. cyl. ax. 75=20/20
O.S. fingers at six inches not improved.

The left cornea appeared quite hazy except in the upper nasal quadrant, where the pattern of the iris could readily be seen. *Fig. 6* is a stereoscopic picture of the eye and *Fig. 7* is a photograph of the artist's drawing. The pupil could be seen indistinctly and motility seemed to be normal. The golden brown bands on the superficial surface of the left iris were even more prominent where the cornea was sufficiently transparent for them to be seen.

Slit-lamp Examination. — The central portion of the cornea was clear, but extending around the periphery directly upon its posterior surface was a semi-transparent membrane. This membrane was about 1.5 mm. wide at the nasal side. Following the circumference of the cornea upward the membrane became fenestrated. To the temporal side it became quite broad again, while below and temporarily it was very narrow. A few pigment granules were present in the membrane. The left eye showed a brown pigmentation in the superficial layers of the cornea near its center, resembling an organic silver stain. The substantia propria was generally opalescent and extending over the greater portion of the posterior surface was this transulcent membrane. A few lines were present in the cornea, which resembled shadow vessels, but no definite vessels could be made out. In the upper inner quadrant, where the cornea was quite clear, the elevated loops of brownish iris tissue were seen.

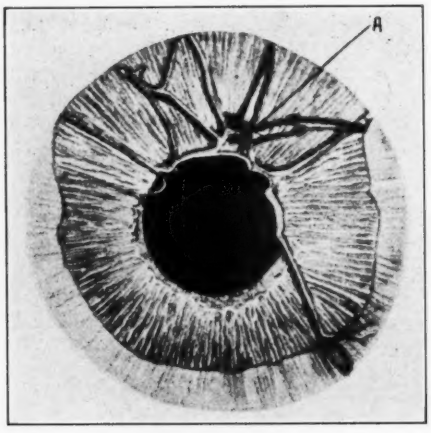

Fig. 2

(Mann) Hyaline membrane upon the posterior surface of the right cornea of a girl of 8. (From the *British Journal of Ophthalmology.*)

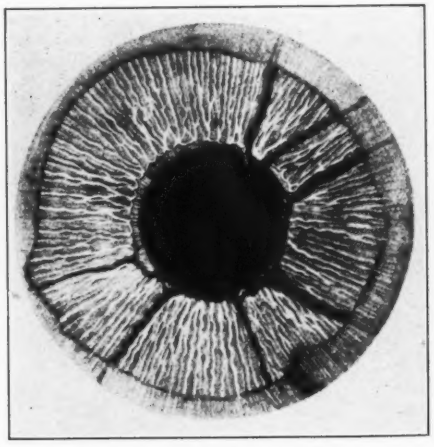

Fig. 3

(Mann) Hyaline membrane upon the posterior surface of the left cornea of a girl of 8. (From the *British Journal of Ophthalmology.*)

Fig. 4
Stereoscopic photograph of the right eye of case reported showing the hyaline membrane.

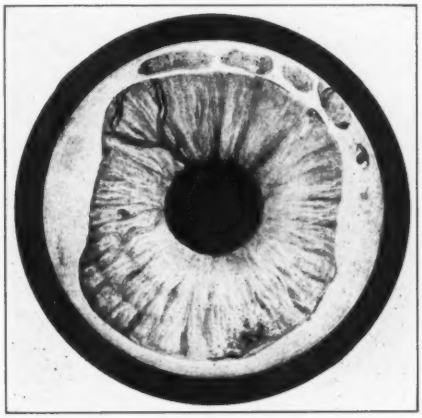

Fig. 5
Photograph of artist's drawing of the right eye of reported case showing position of the membrane on the cornea and the thickened band on the iris.

Ophthalmoscopic Examination.—In the right eye the lens and vitreous were clear; outlines of the nerve were distinct; color and cup were normal. In the left eye, there was a slight red reflex, but no details of fundus could be made out owing to clouding of the cornea.

ETIOLOGY

Whether the condition is to be considered as one of arrested development or of an abnormal development resulting from an intrauterine inflammation is difficult to determine. Mann suggests the possibility that an increase in the amount and undue persistence of the post-endothelial tissue which forms the anlage of the pupillary membrane and the anterior layer of the iris may be the etiology. It seems, however, that a low grade intrauterine inflammation could explain more satisfactorily the formation of a hyaline membrane which in turn might retard the development and produce a microphthalmia as occurred in this case. Ballantyne's case, although not quite parallel to this one, did show evidences of a low grade inflammation. Herbert[6] has studied the formation of similar membranes following chronic cyclitis by the use of special staining and came to the conclusion that chronic inflammatory conditions could produce a metaplasia of the corneal endothelial cells which secrete a single layer of glass membrane. If this is the proper explanation, it is rather easy to postulate a very early inflammation with the production of such a hyaline-like membrane as shown in the illustrations. In case the membrane was laid down around the periphery of the cornea as it is in the right eye, probably no arrest of development would occur, but if it practically covered the cornea as in the left eye, this could, it

Fig. 6
Stereoscopic photograph of the left eye of reported case showing small cornea and general haze.

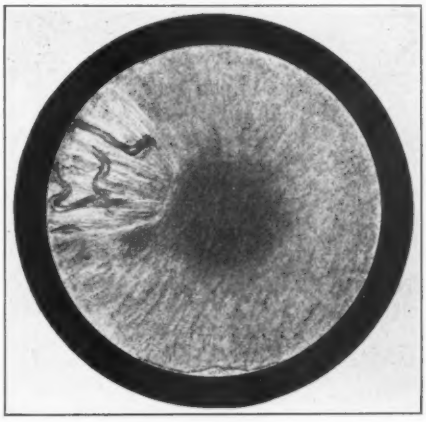

Fig. 7
Photograph of artist's drawing of left eye showing greater portion of cornea covered by the membrane and the thickened bands on the iris up and in.

would seem, alter the normal growth and enlargement of the cornea, as occurred in this case.

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DISCUSSION (*Abstract*)

Dr. Lawrence T. Post, St. Louis, Mo.—Congenital glass membranes in the anterior chamber are certainly rare; whether acquired membranes are unusual seems to be a mooted point. Lehmann states that they occur in 17 per cent of cases of syphilitic keratitis, but are mistaken for folds in Descemet's membrane (*Archives of Ophthalmology*, 10:517). There are, according to Ziposkes, two distinct types, those which are in contact with the endothelium and those which appear as a spider-web-like membrane in the anterior chamber extending from pseudopodia, having origin in the endothelium of the cornea. The former is the common type and the one described by Lehmann in interstitial keratitis. Inflammation or other corneal disturbances seem to be generally responsible for the condition. The idea has been suggested that the free bands are formed by endothelial secretion on fibrous tissue associated with inflammation in the anterior chamber.

My personal experience is limited to one case seen and herewith presented through the courtesy of Dr. William James, whose patient this man is.

A white man, about 60 years old, was operated upon for cataract in his left eye some two years ago. The extraction was uneventful, but at the first dressing the cornea was noted to be much thickened and very white. This condition lasted for many months, during which time the opacity slowly cleared. When it was sufficiently transparent for observation, glass membranes were noted.

Examination two weeks ago showed a cornea which was almost clear. Extending from a white fibrous looking mass in the region of the wound, in close apposition to Descemet's membrane, were distinct glassy bands forming an irregular horseshoe about two or three millimeters from the limbus and almost encircling the cornea. There did not appear to be perfect continuity throughout the entire horseshoe. There were strands stretching laterally in several places. At one spot a short band appeared possibly to be separated from the cornea. Many strands contained a few scattered pigment cells. The picture certainly suggested that the strands were the result of endothelial cell secretion.

Dr. S. Weizenblatt, Asheville, N. C.—After cyclodialysis, multiple hyaline particles in rolls or in concave surfaces are not infrequently seen. They are sometimes attached to the iris by an exudate thread, pigmented, or to the posterior surface of the cornea. They are produced when the spatula, entering the anterior chamber, loosens the Descemet from the posterior surface of the cornea. No ill effect was observed from the presence of these membranes.

THE BENIGN NEVUS: THE MALIGNANT MELANOMA*

THE PROBLEM OF THE BORDERLINE CASE

By ROBERT B. GREENBLATT, M.D.,
EDGAR R. PUND, M.D.,
and
GUY T. BERNARD, M.D.,
Augusta, Georgia

"Nous étions deja si vieux quand nous sommes nés."—*Anatole France.*

Phylogenesis.—Aeons of years ago, in the dark abysmal depth of time when the ancestors of man were slowly evolving from the reptile-like stage to the lowly primitive mammal, certain reptilian characteristics were preserved. Amongst these were the pigmented tactile spots which in the course of evolution were replaced by tactile mammalian hair follicles. It is not difficult for us to conjure in our minds an image of an evolutionary predecessor in the mammalian scale, perhaps grotesque and bizarre of shape, slow of movement, the body covered with raised, rounded, pigmented, hairy tactile tubercles by which contact with the external environment was effected.

Fiske,[1] quoting Huxley, points out that all sense organs are but successive modifications of simple dermal tactile structures. From a single sense more or less diffused over the surface of the body, there have arisen by slow differentiation such localized senses as sight and taste. The appearance of the first faint pigment spot was, by and by, to translate touch into vision. The bulb of the eye is nothing more than an extremely metamorphosed hair sac. The crystalline lens is a differentiated hair, the aqueous and vitreous humors are liquefied dermal tissue. Thus, in the phylogenetic development of man, the very rudimentary pigmented tactile of the reptile was later replaced by the hair follicles of the mammal, certain of which later evolved into the specialized organs of sense, to wit: sight, smell, taste, touch, hearing.

In the ontogenetic development of the individual, particularly during the periods of stress of intra-auterine life, reversions or arrests in development take place.[2] These atavistic manifestations resemble the structures in man's phylogenetic development, for man in his phylogeny

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*From the Department of Pathology, University of Georgia School of Medicine, and Tumor Clinic, University Hospital.

passes through all the stages from fish to reptile on to the highest development of the human being. Laidlaw's[3] brilliant studies of sections from the pigmented tactile spots of the alligator noted the striking resemblance in every detail to the nevus, both in the arrangement of the cellular structure and the nerve fibers. He concluded that

"There is, then, a certain point in the growth of human embryonic skin when the dipping of the epidermis and the advancing nerve fibers which normally cooperate to construct innervated hair follicles revert to the construction of innervated reptilion tactile organs."

Would it be trite to say, then, that the commonest human neoplasm, namely, the benign pigmented mole or nevus, is but a trifling case of reversion to type dating back to the phylogenetic period when the ancestors of man, that is, the amphibia and reptiles, were peppered with pigmented spots and tubercles? Its multiplicity then parallels the frequency with which it is found in the human race now, for there hardly exists a person who has not at least one nevus somewhere, at some time in his life.

Purpose.—The title of this paper expresses the purpose of this study. The relative benignancy of this, the most frequent of growths, the pigmented nevus, is universally admitted. On the other hand, its congener, the malignant melanoma, once established, is so deadly as to make it the most dreaded of the neoplastic diseases. But for minor controversial points, there are few if any who will not agree that the cutaneous malignant melanoma develops in the majority of cases from pre-existing nevi or pigmented spots (lentigenes).[4 5]

Our interest and attention has been recently focused on the study of a number of cases which we were at a loss to label from the histopathologic viewpoint as to their relative benignancy or malignancy. To diagnose the latter would be to doom one, perhaps unjustly, to hopeless invalidism and ultimate death. To diagnose the former, we feared, would give the patient and physician a sense of security that perhaps was not well founded. Hence the problem of the borderline case.

It is not without some justice that the banal and universal myth "do not remove a mole" has in a measure taken root in the minds of both the laity and, sad to relate, a great many of the medical profession. Glean through the scores of reported case histories on the subject and one is struck by the oft-repeated description, the gist of which runs as follows: "Three or four years ago the patient had a mole removed, diagnosed as a pigmented nevus; he now returns with local recurrence and metastases." The fault may or may not be with the histopathologist, none the less the stigma remains.

In the past decade the academic interest in the origin of the nevus has been great. The tremendous stimulus responsible for this is indubitably due to Masson's[6] monumental contribution. The clinicopathologic study of these capricious growths, however, has been grossly neglected. It would be superfluous at this time to enter into a discussion of the various theories extant. Suffice it to say that two main views hold sway, the epidermal and the neurogenic schools of thought. The imposing array of facts makes each theory convincing and formidable, yet they are different and for the greater part irreconcilable.[7 8 9] In another paper to be published we intend adducing further evidence in support of the neurogenic hypothesis of Masson. It remains for us now to present and establish the problem of the borderline melanoma.

Material and Methods of Study.—Ewing[10] and others have emphasized the apparently in-

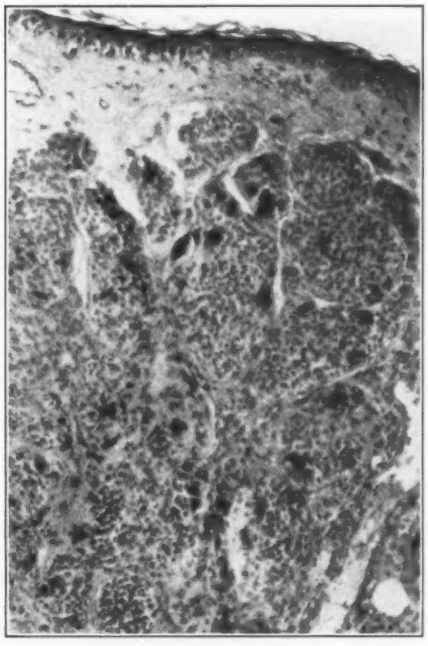

Fig. 1

Simple irritated nevus (Case 1). Note the well defined and orderly cord structures with occasional clumping of cells, giant hyperchromatic mono- and multi nuc'eated nevus cells.

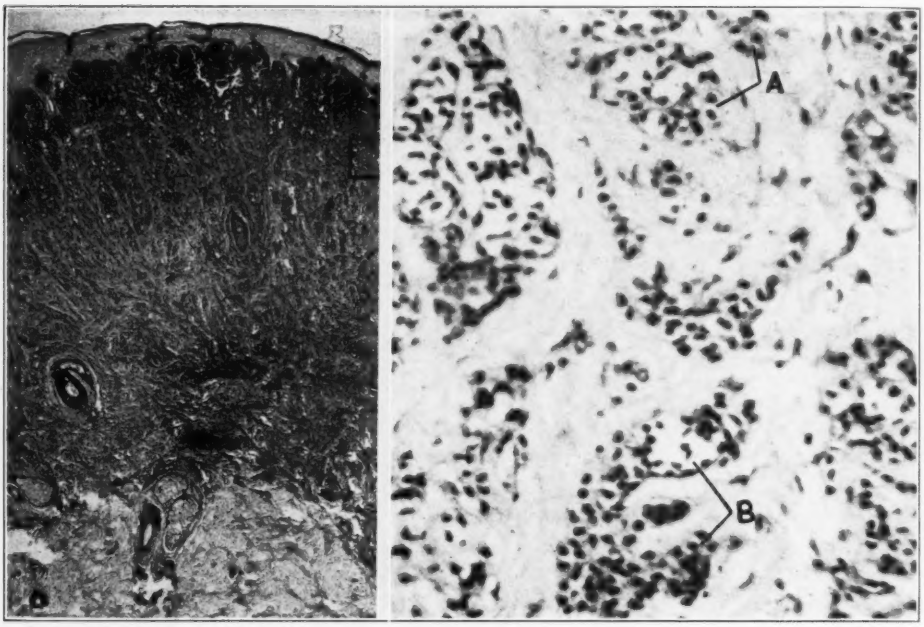

Fig. 2 (left)
Slowly growing nevus (Case 2).

Fig. 3 (right)
High power microphotograph of squared area in Fig. 2. Note at A, the pale glassy nevus cells with pyknotic nuclei. Note at B, small cells with pyknotic nuclei forming massive cords or lining spaces that have a definite framework.

nocent histological and clinical characters of certain moles which have given rise to metastases. Stout[11] firmly believes that it is definitely established that pigmented moles in the skin are potentially precancerous. Becker[12] and Dawson[13] are convinced that there is a gradual transition from benign to malignant melanoma. We have therefore endeavored to trace by a study of the clinical course and the histological interpretations of our large series of cases the various steps in the curious and insidious transitions from vestigial cell nests to pathological cell growth, in the hope of recognizing the earliest changes in cells which mark them out on their path to malignancy.

The material used in this study embraces a laborious and critical analysis of some 225 consecutive cutaneous pigmented growths examined in our laboratory, further scrutinized by a careful and intimate follow-up of the greater number of the patients. We have attempted to correlate the clinical manifestations such as recent growth, increase in pigmentation, itchiness, ulceration, bleeding, irritation, inflammatory changes, infection, site, duration with the histopathologic findings. This has provided data from which certain deductions have been formulated.

Of the 225 cutaneous pigmented growths only

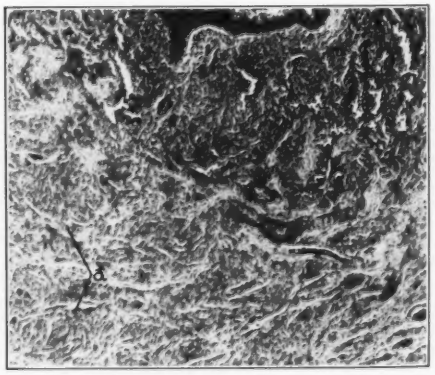

Fig. 4
Irritated, painful, growing nevus (Case 3). Note cellular spacing and looseness with early acinar formation. Note (a) the lames foliacees and neuroid bundles occupying the corium.

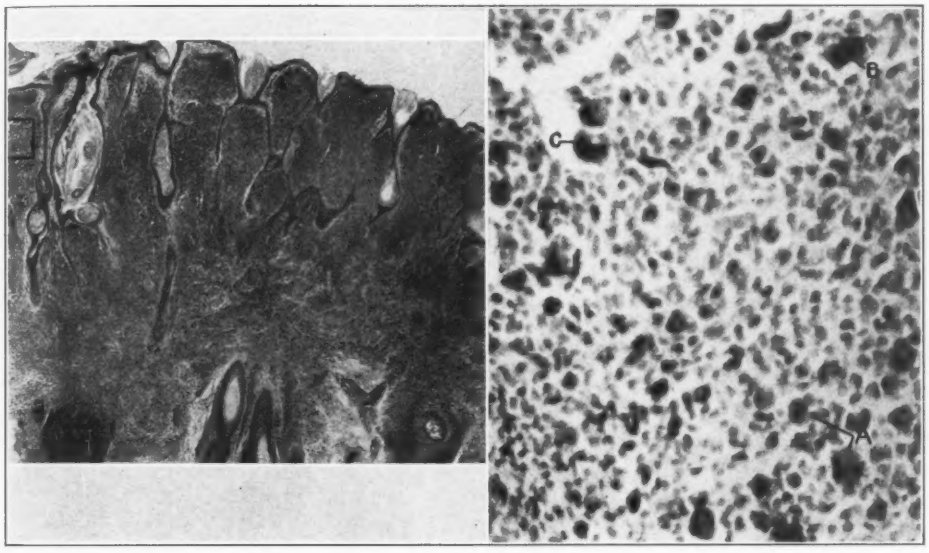

Fig. 5 (left)
An aggressive nevus (Case 4).

Fig. 6 (right)
High power microphotograph of squared area in Fig. 5. Note the cellularity, loss of cord structure and early looseness of cells. (A) Melanoblasts of various size with fine pigment granules (indistinctly seen). (B) Melanophores with coarse pigment granules. (C) Mono-nucleated cell with giant nucleus and vacuolation of cytoplasm.

160 were included in this study. The remainder were excluded, for on histologic examination they proved to be pigmented papillomas or epitheliomas, cavernous hemangiomas, vascular nevi, and so on. Our series of cutaneous moles was supplemented by three cases from other clinics. The group under study was classified as follows:

163 CUTANEOUS MOLES

Quiescent Nevi	Active or Aggressive Nevi	Borderline Cases		Malignant Melanoma
		Early	Late (or low grade malignancy)	
70	51	6	4	29
		1	2*	

*We wish to acknowledge the courtesy of Dr. S. William Becker, of the University of Chicago, and of Dr. J. E. Pritchard, of the Montreal General Hospital, in furnishing us with three interesting borderline cases which were of inestimable value in our studies.

The routine fixatives for our specimens were formalin and Bouin's picro-formol. The stains employed were hematoxylin and eosin, Masson's trichrome blue, Laidlaw's modification of Bloch's Dopa reaction, and Fontana's silver stain for melanin.

HISTOLOGIC CONSIDERATIONS

The Simple Irritated Nevus. Case 1 (No. 23787).—A white woman, aged 40, had had a pigmented mole on her chin for many years. Recently it had been irritated at times. It was completely excised.

Histologic examination revealed masses of pale nevus cells arranged in cords. A relative increase in vascu-

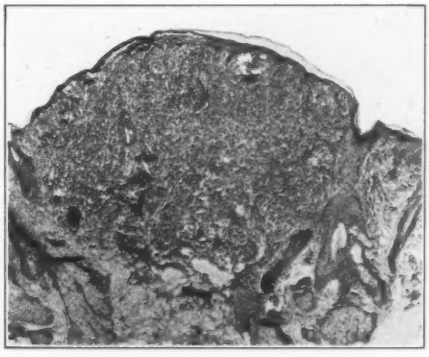

Fig. 7
Early borderline case (Case 5). Note diffuseness of the cell growth without orderly arrangement. Attenuation of epidermis and the melanoblastic activity near the epidermo-dermal junction, particularly left upper corner.

larity was noted. It differed from the quiescent nevus in that it showed considerable clumping of cells together with hyperchromatic nuclei and giant nevus cells which are mono- and multi-nucleated (*Fig. 1*).

The Slowly Growing Nevus. Case 2 (No. 15797).—A white woman, 39 years of age, had a mole on her face 1 cm. in diameter, slowly increasing in size. It was completely removed by excision in 1931.

Histologic examination revealed dense columns of cells arranged either in massive cords or in alveolar formation resembling a pseudoendothelial arrangement (*Fig. 2*). The cells were uniformly very small with pyknotic nuclei and line spaces that had a definite supporting framework. In the vicinity of these lined spaces there were occasional typical glassy nevus cells with a central pyknotic nucleus (*A-Fig. 3*). The epidermis was attenuated but intact throughout.

The question arises: are these very small cells with hyperchromatic pyknotic nuclei and little cytoplasm forming small cord masses or lining spaces (*B-Fig. 3*) merely atrophic cords or are they young, immature anaplastic nevus cells?

We prefer to lean towards the latter view, for we have noted quite frequently similar areas in early malignant melanomas. We believe, therefore, that nevi of this type should be regarded with caution and should be completely removed. Because of the marked variation from the usual morphological cell type it should be regarded as an example of anaplasia with definite potentialities for growth.

The Irritated, Painful and Growing Nevus. Case 3 (No. 22587).—A white woman, 30 years of age, had had a pedunculated mole 1.5 cm. in size on her back all her life. It had been irritated and painful at times and had increased in size recently.

Microscopic examination revealed a typical neuronevus with an irregular indenting epidermal surface. Throughout the dermis there were superficial cords of typical nevus cells. The underlying corium was composed of neuroid bundles rich in the "lames foliacées of Masson." Moreover, in certain fields definite loosening of cell structure and acinar formation is to be noted (*Fig. 4*).

The Aggressive Nevus. Case 4 (No. 4092).—An adolescent boy had a hairy mole that had recently increased in size. It was removed by excision in 1924.

Histologic examination revealed a very cellular pigmented papillary nevus (*Fig. 5*). The papillae were packed with masses of nevus cells superficially abundant in melanoblasts and melanophores. No orderly columns nor cord-like arrangement was visible. Scattered throughout were nevus cells varying in size and shape, but usually polygonal or spherical, with a well stained nucleus rich in chromatin. The cytoplasm was pale, often bordered by a collar of fine pigment granules at the periphery. Here and there were large, deeply staining melanoblasts with fine granules (*Fig. 6-A*) and occasional melanophores with abundant coarse pigmented granules (*Fig. 6-B*). Early but slight spacing of cells is noted with rearrangement and clumping of cells so as to contain from two to five nuclei. These are markedly hyper-

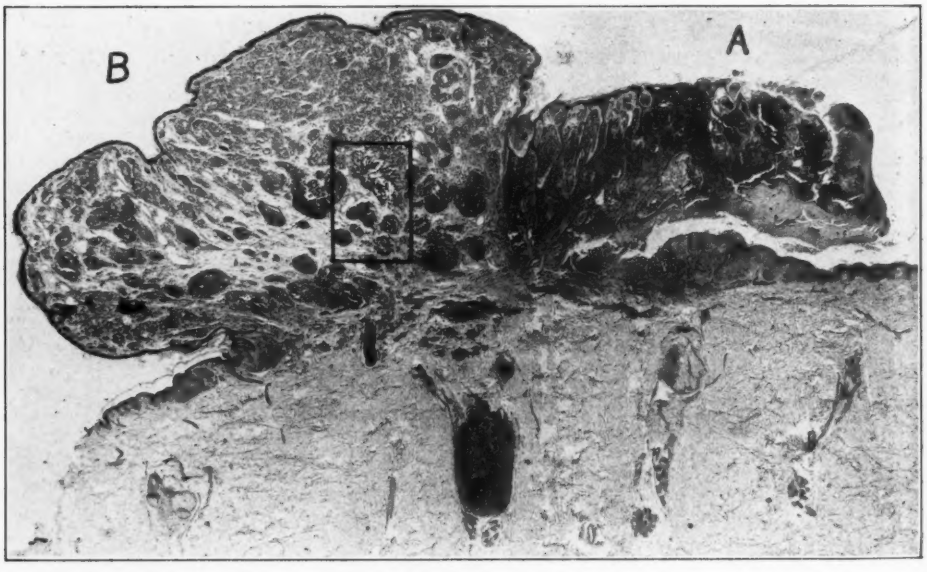

Fig. 3

Late borderline case (Case 6). Pedunculated growth above skin surface, completely excised. (A) Acanthotic nevus. (B) Proliferative and growing portion of the nevus. Note sudden change in cellular structure and arrangement. Also note the two columns of cells laden with pigmented nevus cells in the corium.

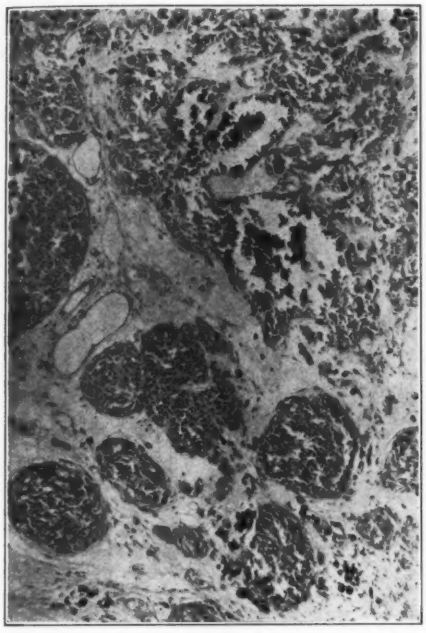

Fig. 9

High power microphotograph of squared area in Fig. 8. Note the cords of nevus cells, the melanoblasts lining spaces, looseness of cellular structure and loss of cohesion of cells. Note the loose nevus cells in the edematous stroma and the thin walled lymphatics and capillaries.

chromatic. Occasional hyperchromatic cells with giant nuclei and vacuolation of cytoplasm were observed (*Fig. 6-C*). The corium was infiltrated with these cells. Here pigment was lacking and gradual change in the contour of the cells was noted, so that they appeared elongated. Many hair follicles were present. No mitotic figures were seen, while a moderately slight round cell stroma reaction was observed.

The Typical Early Borderline Case. Case 5 (No. 23420).—A white girl, aged 12, had a pigmented nevus on her nose. This nevus had shown sudden growth in the previous few months. It was completely excised.

On microscopic examination a small cellular growth composed of nevus cells was observed. The cellular proliferation was diffuse, without arrangement and with loss of cord structure. There was definite evidence of melanoblastic activity and proliferation at the epidermodermal margin. At one point the epidermis was markedly attenuated where the new growth had encroached upon it. Marked cellular pleomorphism was noted. Occasional superficial clumping of cells was seen. Loss of cellular cohesion with loosening and spacing of cells was found in several areas. The cells were elongated and appeared fusiform in shape deeper in the dermis. Deep extension in the dermis of cell nests showing pigment activity was visible. A marginal and focal round cell stroma reaction was present. Mitotic figures were nowhere to be seen (*Fig. 7*).

Late Borderline Case. Case 6 (No. 20833).—A white woman, 35 years of age, had a pedunculated mole removed from her left breast early in 1934. The clinical history was that of recent enlargement of one portion of this mole, changing its general appearance. She, becoming more conscious of it, had the growth removed. It was completely excised (*Fig. 8*).

Microscopic examination revealed a pedunculated pigmented nevus, the growth more or less taking place above the surface. The growth, morphologically, was composed of two parts, one of which (*A-Fig. 9*) was an acanthotic nevus. The epidermis showed acanthotic changes while in the interpapillary bodies were solid cords of nevus cells, displaying to a degree irritative changes such as clumping of cells with hyperchromatic nuclei.

There was an abrupt change in the type of growth in the remaining part (*B-Fig. 9*) which was composed of irregular cords of nevus cells with very finely pigmented granules in the cytoplasm, lying in a loose edematous stroma in which were seen many thin-walled lymph spaces and capillaries. Here and there were loose spaces lined by a single to several layers of nevus cells, some of which were markedly pigmented. Here definite loss of cohesion of cells was to be noted. Strewn throughout the stroma were loose pigmented and unpigmented nevus cells which varied somewhat in shape and were spindle, ovoid, crescentic, stellate and ameboid. Occasional large melanophores gorged with phagocytized coarse pigment granules were found clustered near vascular and lymph spaces. Deep pigment activity and infiltration were present. Two solid cord-like columns were noted composed of polyhedral nevus cells, many of which were deeply pigmented. Mitotic figures were nowhere to be seen, nor is there any stroma round cell reaction to be observed.

One dose of x-ray therapy was administered; further treatment was refused. The patient as far as could be ascertained is alive and well.

Low Grade Malignant Melanoma. Case 7 (No. 17257).—A white woman, aged 54, had had a mole on her shoulder since birth which had shown rapid growth for the previous year and bleeding for several weeks. This was completely and widely excised in 1932 (*Fig. 10*).

Microscopic examination revealed a pedunculated ulcerated growth situated entirely above the skin surface. At the periphery of the growth the epidermis was intact, and immediately beneath it (at a, *Fig. 11*) were cords of nevus cells occupying the superficial dermis. In another area (b, *Fig. 11*) occasional nests of intra-epidermal proliferation of melanoblastic cells were noted. The growth itself was composed of irregular groups of cells showing variegated morphological features. Groups of sarcomatoid spindle cells, syncytial sheets of pale staining epithelioid cells and nests of pseudoendothelial structures were seen. A marginal plasma-cell-round-cell stroma reaction was present, very occasional mitotic figures were found, and no invasion of the corium was to be observed.

Three years later the patient presented herself with a very small local recurrence and a metastatic nodule in the anterior chain of axillary lymph nodes. It was interesting to note that the recurrence on histopathologic study did not reveal any nests of typical nevus cells in the dermis, but rather definite proliferation of the melanoblasts at the junction of epidermis and dermis extending somewhat into the superficial corium. This, in a measure, confirms Becker's[12b] stand that these

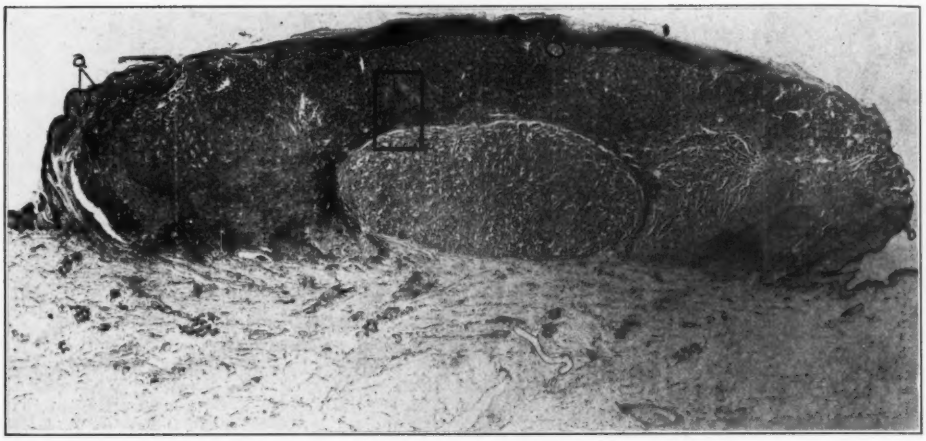

Fig. 10

Melanoma of low grade malignancy (Case 7). Note the growth is entirely above the skin surface. No invasion of the corium is visible. At A, cords of nevus cells. At B, intra-epidermal melanoblastic cell proliferation.

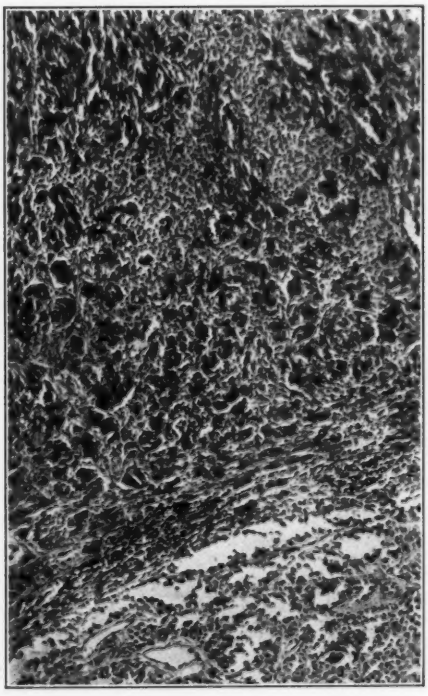

Fig. 11

High power microphotograph of squared area, showing the syncytial masses of pale nevus cells lying between nests of sarcomatoid spindle cells. Note the pseudo-endothelial structure of the growth in the lower right corner.

malignant tumors originate in the melanoblasts at the junction of the epidermis and dermis.

COMMENT AND SUMMARY

It is not without some misgivings that we employ the term "borderline case." Masson[6b] is astounded by the success of the term in America. It implies hesitation. A tumor is benign or malignant. There is no intermediate stage. Generally speaking, we are in absolute accord with this view; however, in the study of the transition of the pigmented nevus to malignant melanoma, we feel that it is analogous to tar and x-ray cancers of the skin. Here, too, very often there is a history of more or less long-continued irritation. Yes, repeated trauma and insult of a pre-existing nevus that is potentially capable of growth. Unquestionably there is considerable evidence of the transition of benign nevi to malignant melanoma following prolonged insult, but the *post hoc ergo propter hoc* argument is notoriously fallacious and it behooves us therefore to be cautious before drawing broad conclusions.

In presenting a series of histopathologic observations of the various irritative, proliferative, structural changes to which a quiescent nevus is subject following repeated trauma, recent growth, some extraneous stimulation, or loss of physiological equilibrium, a phase is reached when it is difficult to prognosticate as to the future behavior of the growth. Indeed, the word "borderline" does signify and mark hesitation. But the fact that apparently histologically innocent nevi have been reported to give rise to metastases is

in itself an admission that certain pertinent cellular and structural changes have not been hitherto generally recognized. For this reason alone the clinicopathologic study of the pigmented mole is justifiable and important. The word borderline is, moreover, convenient and commodious and merits a place in the terminology of the pathologist.

The diagnosis "borderline melanoma" at once stamps a growth as probably benign, but possibly malignant and hence requires active and often heroic treatment. In this connection Ewing[10b] believes that doubtful cases should receive the full value of x-ray therapy.

It has long been the rule in our tumor clinic to consider every mole, regardless of its position, shape, size or color that shows signs of activity, namely, itchiness, pain, inflammation or growth, or which has been the object of repeated traumatism, as potentially malignant and to be widely excised.[14] Should microscopic examination reveal such aggressive changes as to label it a borderline case, the patient receives the benefit of x-ray therapy or radium.

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HISTOLOGIC FINDINGS IN THE GRADUAL TRANSITION OF THE BENIGN NEVUS TO MALIGNANT MELANOMA

The Quiescent Nevus	Quiescence	(1) Orderly cords of nevus cells in the dermis (2) Pigment activity present in zone between the superficial nests of nevus cells and epidermis (3) Neuroid bundles deeper in dermis
The Irritated Nevus	Cellularity	(1) Early cellular proliferation with or without increase in pigment activity (2) Clumping and vacuolation of cells with the appearance of mono-nucleated and multi-nucleated giant cells which frequently show hyperchromatic and giant nuclei (3) Melanoblastic activity at the epidermo-dermal junction
	Cellular Cohesion	(1) Loss of ordered arrangement of cells in cords and columns (2) Loss of cohesion of cells accompanied by spacing and loosening of cells showing change in shape and size and suggestive ameboid activity
The Aggressive Nevus	Extension	(1) Encroachment and attenuation of epidermis (2) Extension of pigment activity deep in growth
Borderline Melanoma	Abnormal Cellular Activity	(1) Pleomorphism of cells with evidence of anaplasia and metaplasia (2) Rearrangement of cells into (a) Syncytial epithelioid masses (b) Sarcomatoid strands of spindle cells (c) Pseudoendothelial structures
	Stroma Reaction	(1) Marginal or streaked round cell-plasma cell infiltration
Low Grade Malignancy	Invasion	(1) Disorganization and invasion of epidermis (2) Invasion of corium and subcutaneous tissue
	Mitosis	(1) Few or numerous
Advanced Malignancy	Metastasis	(1) Satellite nodules (2) Regional metastases (3) Generalized metastases

CONCERNING COLOSTOMY*

By FRED W. RANKIN, M.D.,
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There are good reasons why one dares to discuss colostomy, two of which are: first, the unfortunate condemnatory attitude of a large percentage of the profession, as well as the laity, toward it; and second, the necessity of emphasizing some of the modern technical steps which promote comfort of the patients upon whom this operation has been performed. That the medical profession, or at least, that some members of the medical profession, and I regret to say even some of the older surgeons, have adopted a pessimistic attitude toward colostomy as a step in the radical cure or comfort of a patient with cancer of the rectum, is unfortunately true. That occasionally a physician is willing to go so far as to advise a patient with a cancer of the rectum against operative maneuvers which have as one of the stages the manufacture of an artificial anus, cannot be denied.

Consequently, it is easy to understand the average patient's abhorrence of colostomy, and while it may be due in a large majority of cases to the ability to view the artificial anus, it is unquestionably in part due to the prejudice handed down from the earlier days by both laymen and surgeons. It seems impossible for any member of the present day profession longer to justify himself in refusing to accept colostomy as a part of the necessary procedure for the radical removal of a rectal growth because of statistical data available to prove incontrovertibly that thousands of persons in every walk of life are comfortable and contented and little handicapped by the artificial opening.

To justify the assertion that operative relief or cure of cancer of the rectum entails the performance of a colostomy in a large percentage of cases is, I think, easily provable to one of open mind. It is my belief that colostomy is a basic part of any operation which offers the best chance for longevity to the individual suffering from cancer of the rectum or rectosigmoid, and in consequence, I have little or no enthusiasm for operations which are local in nature and which attempt to get rid of the growth without a radical removal of glands and gland-bearing tissues in immediate juxtaposition to it.

We have two offensives against cancer of the rectum and rectosigmoid, namely, surgery and irradiation. That radical surgery offers the highest percentage of cures and freedom from recurrence over a long period of time is difficult to controvert. The role of irradiation is still uncertain and it is not my province in this paper to discuss it, but I may perhaps be permitted to say that there is a definite field of usefulness for it and that perhaps as time goes on and more data are available as to end results following its use, there will be a more standardized opinion as to its utility, not only alone, but in conjunction with radical surgery.

That there is no one operation for cancer of the rectum and rectosigmoid is obviously true and one must have, if one would operate upon a large number of these cases as they appear for examination, several procedures available, but these procedures, in my judgment, all have a common fundamental in that they may be performed radically and most hopefully only by utilizing a colostomy as one of the stages.

Historical.—Colostomy is one of the oldest operations in surgery. At the same time it is one of the most maligned of modern operations both by the surgical profession and those of the laity whose misfortune it is to need such a procedure. Decompression of the bowel, bringing it to the surface of the abdominal wall and opening it, was first thought of by Littre in 1710. He proposed to bring the sigmoid flexure out through a lumbar incision and put a tube in it after attaching the bowel to the abdominal wall by means of a thread carried through its mesentery. His patient was a child with an imperforate anus; however, there is no record that he carried out such a procedure on a living subject, although unquestionably he did establish the principle of decompression of obstruction by his idea.

Pillore, of Rouen, in 1776 performed the first inguinal colostomy for obstruction due to cancer of the rectum. This operation actually was a cecostomy through a right inguinal incision such as later came in vogue, and was successful in that the patient lived 28 days, dying from causes other than those due to the operation.

Duboise and Duget, in 1783 and 1793, respectively, performed similar operations upon two children with imperforate anus. The latter case was a successful one, the child living many years. Desault, in 1794, performed another colostomy for imperforate anus, but unsuccessfully. Fine, of Geneva, in 1797 made a

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colostomy in the transverse colon of a woman 63 years of age for obstruction by a rectal growth.

It is interesting to note that the first four decompressions of the colon for obstruction consisted of three for imperforate anus and one for rectal cancer. In 1839, Amoussat proposed an extra-peritoneal colostomy in the left lumbar region and subsequently over the next ten years a number of modifications of his incision to avoid vessels and nerves and to facilitate the exposure of the colon were suggested. Such procedures, however, attained little popularity because the operation can be done only in a loop of bowel which has no mesentery and the cecum can rarely be used in a decompressive maneuver. As early as 1796 Callisen, of Copenhagen, described in his system of surgery an attempt to drain an obstructed bowel by a method which kept outside of the peritoneum.

As late as 1853 there were only 44 decompressive operations reported in the literature, according to Hawkins, and the mortality was enormously high, about one-half of them succumbing, but of course this was prior to the era of asepsis and anesthesia.

Inguinal colostomy has subsequently come to supplant the other varieties and the technic of the manufacture of colostomy, whether inguinal or in other segments of the colon, and whether the condition was malignant or benign, has been developed as a part of the evolution of operations for cancer of the rectum and lower sigmoid.

The first operation for cancer of the rectum dates back to a proposal of Morgani in the Eighteenth Century, and the first attempt at a surgical removal of such a tumor was made by Faget, in 1736. Perineal resection of the rectum for cancer was advocated in 1826 by Lisfranc and carried out by his colleagues until colostomy as a part of the operation came to be recognized as a satisfactory, if not a necessary, step.

Numerous variations in the hands of many surgeons followed, but most of them were concerned not so much with the establishment of an artificial anus as with the removal of the coccyx or some portion of the sacrum to give better exposure of the parts, and consequently permitted more radical procedures. In 1885 Kraske made a contribution to the surgery for rectal cancer when he reported an operation before the Fourteenth Congress of German Surgeons, which consisted of a widespread removal of the rectum and contiguous tissues after the coccyx had been disarticulated and a portion of the sacrum chiseled away. Kraske preserved the external sphincter muscle, however, and advocated a sacral anus.

Many modifications of his operation by Hochenegg, Bardenheuer, Billroth, Rehn, Rydygier and others followed, but all of their operations could be performed with or without a colostomy. The next generation of surgeons began to realize that colostomy was an important part of the procedure if one was to remove gland-bearing tissues and make a widespread dissection in the treatment of rectal cancer. Adams, in 1882, was the first American to perform routinely a colostomy preliminary to rectal resection. Allingham and Kelsey were ardent British advocates. Many distinguished names are found on the list of those who have contributed to the technical knowledge and established the principle that colostomy and the removal of the sigmoidal mesentery are fundamental necessities in radical resection of rectal cancers.

Indications.—There are two indications for colostomy, one as a part of an extirpative procedure for cancer, and the other as a decompressive measure for benign obstruction, such as imperforate anus, or some benign inflammatory lesion such as diverticulitis.

Obviously, when colostomy is attempted for malignancy, it is a permanent affair and may be either indicated as a palliative procedure to decompress the colon against slow stenosis and thus relieve obstruction, or it may be a part of an extirpative procedure, radical or otherwise. The benign conditions for which colostomy is essential are, in the main, congenital deformities of the lower part of the alimentary canal, such as imperforate anus, or other congenital types of constriction, and secondary inflammatory lesions such as diverticulitis, which recede under by-passing of the fecal stream.

Types of Colostomy.—In the main, there are two types now commonly utilized by surgeons: first, the loop colostomy; and second, the single-barreled, or end colostomy.

As a temporary surgical procedure, colostomy is indicated for the relief of obstructive lesions of the large bowel and rectum which are either to be subsequently resected, or which under adequate drainage over a long period of time disappear of their own accord.

In the latter group, one finds frequent use for colostomy in the treatment of diverticulitis. Diverticulitis, unless it is complicated by ab-

scess formation perforating into another viscus or onto the abdominal wall, or obstructing, or simulating carcinoma, is best treated not by resection, but by prolonged drainage with a colostomy. The hazards of resection of inflammatory lesions are being more fully appreciated of late, and experience has taught us that a great many of these tumors which are causing obstruction do disappear under prolonged drainage and that the subsequent re-establishment of the continuity of the bowel is frequently possible without resection and anastomosis.

In the congenital conditions such as imperforate anus, temporary colostomy or perhaps permanent colostomy in some cases is distinctly indicated. It perhaps is not indicated at the early time at which it is frequently done. Usually, as soon as a baby is found to have an imperforate anus, there is a hurried exploration of the perineum to ascertain whether the blind loop of bowel may be opened in this location. If it is felt that this is not possible, immediately there is haste to perform a colostomy. Frequently haste is unnecessary and there is ample time to seek surgical consultation or to transport the infant to a medical center where experienced advice is available. I have no doubt that the large majority of these infants could go 48 to 72 hours without great detriment to their future, and certainly if these cases were treated more deliberately and by more experienced surgeons, a properly performed colostomy would be the result and the antiquated methods of decades ago which have been abandoned by experienced surgeons but are still in vogue with the occasional operator, would not result. I mention this particularly because six times in the past five years it has been my unpleasant duty to remodel colostomies in infants with imperforate anus. In each case the type of colostomy performed had been the long-abandoned variety of suturing the bowel to the peritoneum and puncturing it without bringing out a loop on the abdominal wall.

Technic.—The three features which have stood me in good stead in the manufacture of colostomy, regardless of its type, and which insure comfort to the patient by not only avoiding certain unpleasant sequelae, but increasing the facility with which it may be taken care of, are in order: first, taking all the slack out of the bowel so that it is pulled down from above as far as its mesenteric attachments will permit; second, bringing the bowel out through a small incision, usually a stab wound in the left groin; and third, bringing the lumen of the bowel (in a loop colostomy) entirely outside of the abdominal cavity.

The type of maneuver which does not bring the loop outside, but sutures it to the peritoneum and subsequently punctures it is entirely undesirable for many reasons: first, it allows part of the fecal column to go down into the lower loop; second, it has a tendency to close up; and third, it is frequently accompanied by a tendency of the mucous membrane to prolapse, usually from above downward, and not infrequently from below upward. I have seen the entire sigmoid prolapsed from below upward, not only from this type of colostomy, but occasionally from a loop colostomy.

If one takes the slack out of the colon, pulls it down until it is taut, and then, through a small wound, brings out the loop of bowel and snugs the abdominal wall closely around it, at the same time bringing the peritoneal and skin layers under the loop, usually there is small difficulty in the subsequent care and handling of the stoma.

Once a loop colostomy is made, it need not be

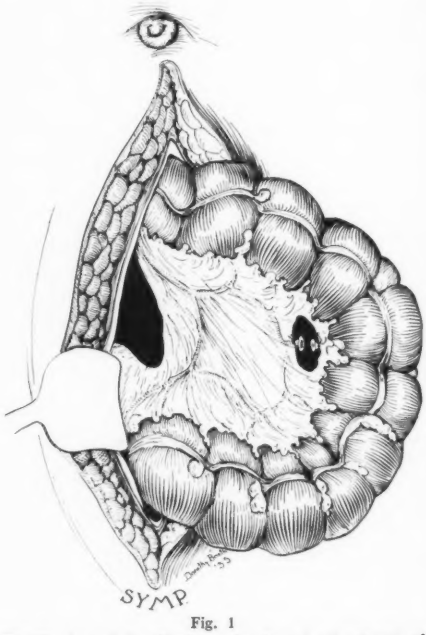

Fig. 1

The ligation of the blood supply close to the lumen of the bowel is shown. The vascular arcs are preserved. Sufficient space is made to permit the division of the bowel and inversion of the distal end.

opened for 48 hours, and frequently it need not be opened for a matter of five to seven days. It is not uncommon for gas to pass over the loop easily without discomfort, and in a great many cases, if the fecal column is semi-solid or liquid, the bowels will move over the loop quite easily and without obstruction. When distention occurs and it becomes necessary to decom-

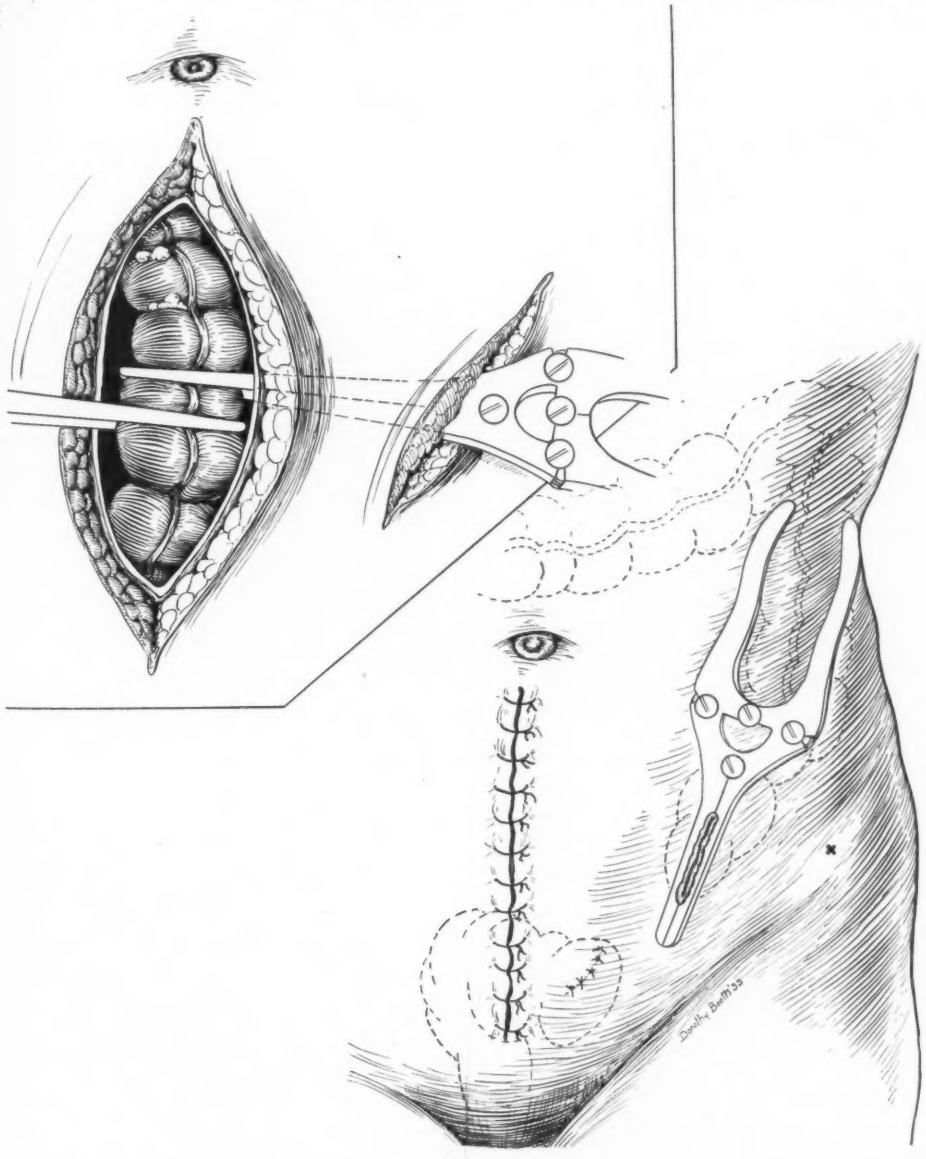

Fig. 2

Insert shows the exploratory mid-line incision, and lateral to it is a stab wound made for bringing out the proximal loop for a colostomy A Payr clamp is thrust through this wound and grasps the bowel at a selected point. A second Payr clamp is put on parallel to it, the bowel is divided with a cautery, the proximal end pulled out through the stab wound, and the distal end inverted. On the right is shown the completed first stage of the operation with the Payr clamp left on.

press the colon, this is easily done by opening the top of the loop with a cautery to permit the egress of gas and fecal material. Subsequently, and before the patient is dismissed from the hospital, the bowel is cut completely across, if the colostomy is to be a permanent one. This separates the two ends for a matter of one-half to one inch, and the skin margins are pulled under the loop. This prevents the fecal current from pouring down into the distal segment.

The exact location of the artificial anus on the abdominal wall is still being debated by

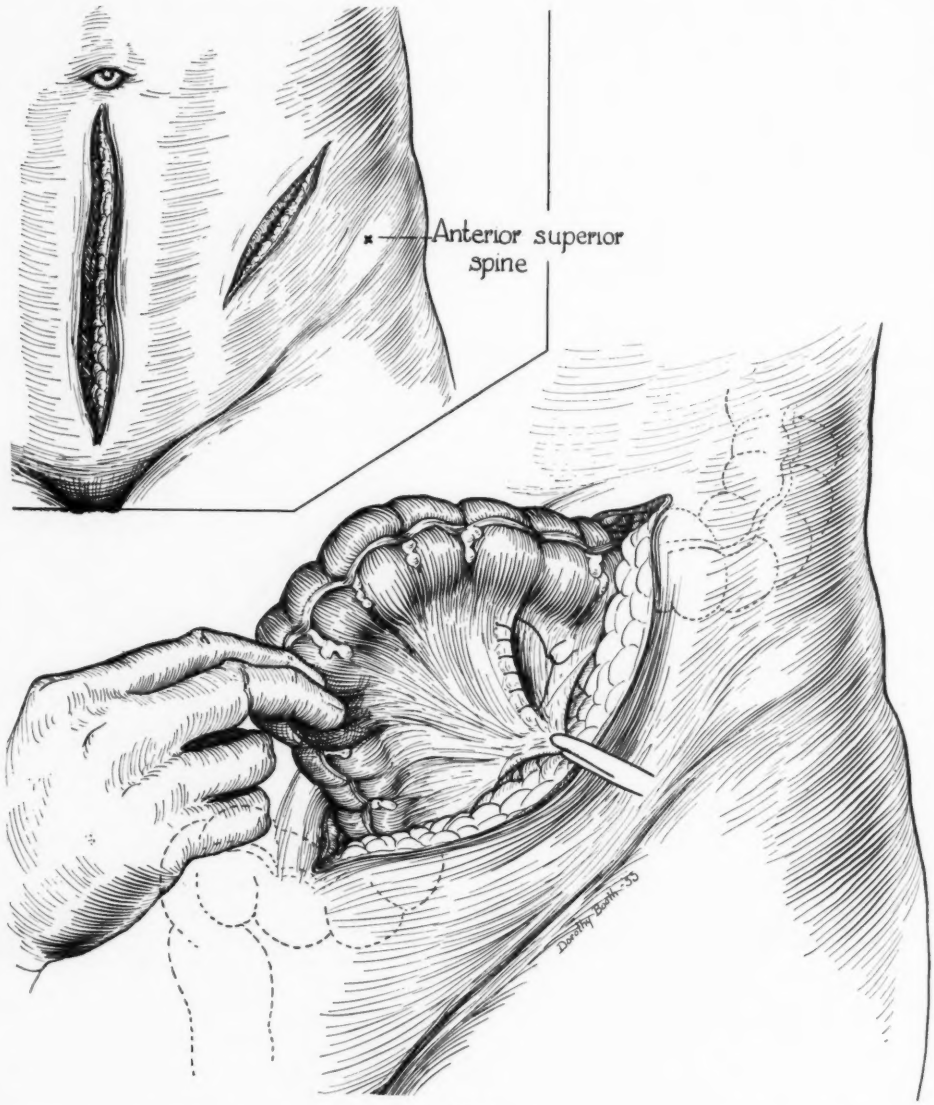

Fig. 3

In the upper corner of the picture is shown the low mid-line incision for exploration, and lateral to it the wound for bringing out the colostomy. In the lower part of the picture is shown the placement of the suture which shuts off the space between the mesentery of the bowel and the lateral parietal peritoneum.

surgeons, the three main locations being: first, through a stab wound in the left groin; second, in the middle or upper portion of a low mid-line incision; and third, at the site of the umbilicus, which has been removed.

There are various advocates of all of these locations, and reasons advanced for utilizing each. Hirschman, of Detroit, is a staunch advocate of removing the umbilicus and utilizing its location for the site of the colostomy. Jones, of Cleveland, prefers to put the colostomy in the upper part of the midline incision, leaving the umbilicus. In my own experience, the most satisfactory position has been a left inguinal colostomy through a small stab wound. Probably the position of the stoma is largely a matter of personal preference, and is of secondary importance to the fundamentals of manufacture which should be observed in all types regardless of the location.

The manufacture of a single-barreled inguinal stoma is an essential part of radical operations of the Miles and Rankin types, and in my experience is the most satisfactorily managed of any artificial anus. In manufacturing any type of colostomy as a part of a procedure for extirpating a carcinoma in the rectum or rectosigmoid, the exploration of the abdomen should be carried out through a low mid-line incision and the sequence should routinely be from above downward.

One need not in this present day emphasize the grave necessity of gentle and careful exploration, particularly when the growth itself is manipulated, for trauma and the loosening of organisms in the peri-rectal tissues are, I am con-

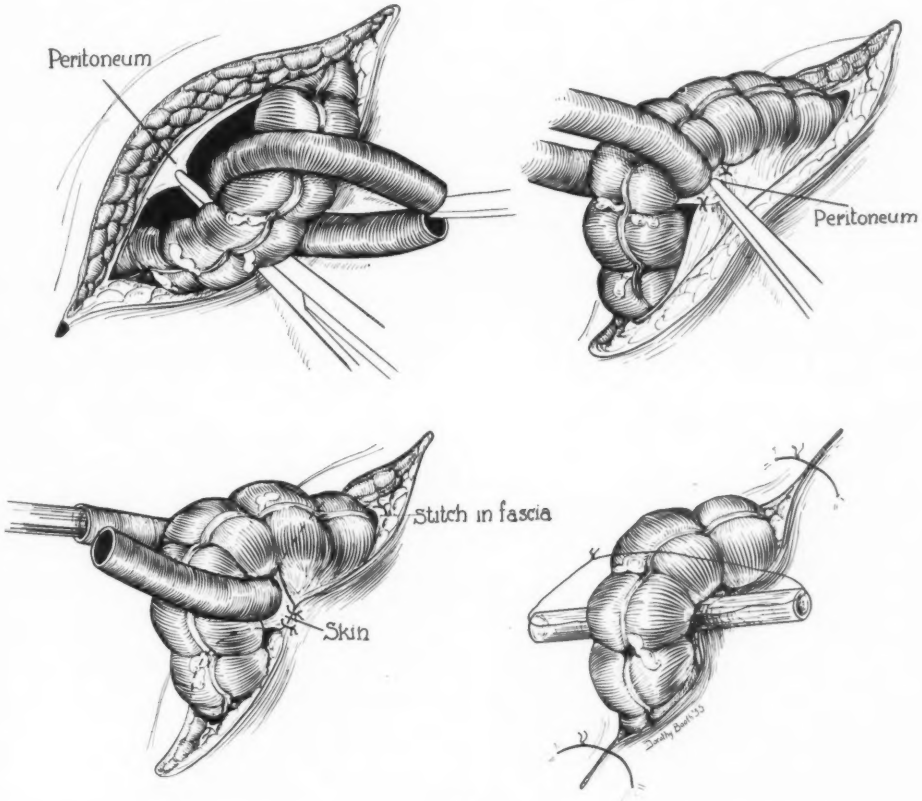

Fig. 4

Above.—The bowel is shown being brought out of the incision and the peritoneum is being pulled under it and sutured.
Below.—The fascia is snugged closely around the bowel and the skin, in addition to the peritoneum, is pulled under the loop.
The completed colostomy with a tube under it is shown in the lower right.

vinced, the most potent factors in the development of the peritonitis which not infrequently follows extirpative maneuvers on the large bowel and rectum.

After exploration through a low mid-line incision, a small stab wound is made in the groin about one-half of the way between the umbilicus and the anterior superior spine of the ileum, and a Payr clamp is thrust through this to grasp the sigmoid in the selected location for the colostomy. Another clamp is put on in the opposite direction and the bowel is divided with a cautery. The proximal end is brought out and the clamp left on for a matter of 48 hours. I have not felt it necessary to put sutures into this limb of the bowel because of the quick healing of peritoneum to peritoneum, and have yet to see a retraction into the peritoneal cavity when the clamp was subsequently removed.

If one decides to do a two-stage operation, the distal end is inverted and dropped back after the blood supply has been carefully inspected to ascertain that it is adequate. If one is doing a combined abdomino-perineal resection of the type of Miles for carcinoma of the rectum, the colostomy and subsequent maneuvers are immensely forwarded by the use of the Zachary Cope modification of the DeMartel clamp. I have recently done a series of cases utilizing this instrument and leaving the metal clip on the colostomy end. This is removed at the end of 24 to 48 hours just as though the Payr clamp had been used. If one is using this clamp for a two-stage operation, the end of the bowel should still be inverted just as though one were utilizing an ordinary clamp, and the metal clamp on the distal segment is removed.

It has been customary in manufacturing a loop colostomy to shut off the lateral space between the mesentery of the bowel and the lateral parietal peritoneum with sutures. If one makes a stab wound, or a split muscle incision large enough to do this, I see no disadvantage in it. In my experience the danger of obstruction from a loop of small bowel's slipping through this foramen is vastly over-estimated. I have never seen such an accident occur.

Mortality.—Mortality following colostomy is influenced by the same factors which govern mortality following operative maneuvers on the large bowel itself, but one probably does not fully appreciate the danger of colostomy until the statistical data of a large series of cases are brought to mind. There is a distinct difference in mortality when the operation is performed as a palliative maneuver for intestinal obstruction, and as the first stage of a radical maneuver for extirpation of growths distal to it.

In the *Annals of Surgery* of January, 1929, I reviewed the mortality statistics of a large series of carcinoma of the rectum, and found that when the operation was performed for palliation, the mortality figure was 7.67 per cent, while the rate for operation in the group in which resection was later carried out was 2.7 per cent. The lethal factors were, in the main, peritonitis and pulmonary complications, peritonitis accounting for the vast majority of the deaths.

Care of Colostomy.—The care of a colostomy and the attitude of the patient toward it are important factors in the subsequent comfort of the patient and thereby govern in a large way his or her social and professional activities. In the first place, let me emphasize the point that all the attempts of surgeons of the past to manufacture a sphincter muscle from the musculature of the anterior abdominal wall have proven futile.

With a properly manufactured colostomy, so long as the stool is formed, the care is relatively simple and easy, and the individual is comfortable. Regardless of the type of colostomy, where it is placed, or by whom it is manufactured, when the patient develops a diarrhea, the only recourse left is to stay at home and care for the condition. Liquid stools make any colostomy intolerable, but are largely the result of indiscretion of diet, and in the large majority of cases may be avoided.

It is impossible to outline a diet which will be suitable for every colostomy case, but in the main more or less constipating foods should be the basis of the diet, and carbonated drinks should be avoided. Occasionally it is necessary to supplement dietary measures by paregoric, bismuth, and other drugs, but usually the patient can work out for himself a diet from which he has one or two stools a day, and can so regulate his hours the colostomy can be emptied, irrigated, and cleansed in the morning, and if necessary again at night, utilizing about one-half to three-fourths of an hour at each time. Between these intervals the only annoyance is from escaping gas, which is never controllable.

As for apparatus to be used over the colostomy, the simpler the more satisfactory they are. I have long since abandoned all the cumbersome belts, cups, and so on, which the instrument houses have for sale, and believe that a simple

Fig. 5
Simple elastic girdle with removable rubber attachment which fits over the colostomy opening.

Fig. 6
Colostomy belt in place.

corset-like, lightly constructed belt with a removable rubber section which may be cleansed from time to time is the most satisfactory of all the types of apparatus (see *Figs. 5* and *6*).

COMMENT

(1) The evolution of the operation of colostomy is briefly reviewed.

(2) The indications for colostomy in both benign and malignant lesions are discussed.

(3) The technic of the two types of colostomy, loop and end colostomy, is described in detail, emphasizing three points which are basic: (a) to take the slack out of the loop being utilized; (b) to make the colostomy through a small stab wound, preventing herniation around the loop as well as prolapse of the mucous membrane; and (c) bringing the lumen of the bowel (in a loop colostomy) entirely outside of the abdominal cavity.

(4) Mortality following colostomy varies according to whether the operation is done as a palliative procedure or part of a resection maneuver. In the former the rate is 7.6 per cent, and in the latter it is 2.7 per cent.

(5) The adequate care of a colostomy depends largely upon: (a) proper manufacture of the stoma; (b) satisfactory dietary regime; and (c) the attitude of the patient toward the colostomy.

(6) Cumbersome and complicated apparatus are abandoned in the care of colostomy and a simple, elastic belt with a removable rubber section is the most efficient and satisfactory appliance.

DISCUSSION (*Abstract*)

Dr. William T. Coughlin, St. Louis, Mo.—Dr. Rankin and Dr. Rainey have said about all that is worth while concerning colostomy. From my own personal experience, I have occasionally learned some interesting things about this condition. First, the bringing out of a loop of sigmoid for a colostomy is not always so simple as a gushing young desk surgeon would have you believe. At times the sigmoid is practically unprovided with a mesentery, in which case it is about as hard to bring to the anterior wall as a loop of the descending colon would be, the more so in fat persons. Again, once the loop has been brought out and "a glass rod stuck through the mesentery," you are not quite done with it. One glass rod has broken and slipped out and the gut has slipped back into the abdomen. Not so good. Again, the glass rod or rubber tube has been removed at the end of ten days, and with the bowel open, the gut has proceeded to retract itself within the abdomen

and once more the feces have gone down the efferent loop. This also is very disagreeable. And, once more, the loop has been pulled out through too narrow an opening or the incision has been closed too tightly around the protruding gut! All has looked very beautiful at the conclusion of the operation, but the next day the whole mass has been gangrenous. Presently, gangrene of the abdominal wall has followed, and a few days later, in spite of all efforts to avert it, a funeral has followed. We have had patients from other clinics with an artificial anus which has so shrunken that the patient was again having symptoms of obstruction. This is something one wishes to avoid. All of the so-called "flap" operations in which a bit of skin or muscle or fascia or, just as well, peritoneum, is drawn from one side to the other through an opening in the mesocolon in order to keep the bowel from retreating within the abdomen, might well be called flop operations. Aside from the fact that their performance leads to more cutting at tissues, they usually end in death of the flap because of the necessary resulting infection. Any flap that is to withstand infection should be extremely well supplied with blood, such as a scalp flap or face flap of skin. Flaps from the abdominal wall, even of skin, are poorly supplied with blood, and much less supplied are those taken from the deeper tissues. The swelling of such a flap will certainly prove ruinous to it in the presence of infection.

When one reads the literature down through the years and sees the names of all the great men who have devised operations for voluntary control of the artificial anus, he wonders. When the individual with the artificial anus becomes aware that his bowel is about to move, it is actually moving and he cannot stop it, even when the bowel has been drawn out and around and between the muscles. So he must wear a bag. A lot of rather unwieldy devices have been made for this purpose. There is always a little leakage; they do not stay in place. I show one here made entirely of a sort of gum rubber and it can be tightly applied, but it, too, will slip around unless the artificial anus protrudes somewhat.

Now the ordinary protrusion of an artificial anus is that due to hernia, and hernia of the artificial anus is something that one tries to avoid. I think the best way to avoid it is to bring the gut out through a sort of McBurney incision and put the upper limb of the loop a little on the stretch. The best thing that I have learned about the subject is not to cut the loop off after it has been drawn out. Since 1909 I have been making the artificial anus in this manner whenever I could. Of course, when one does the combined abdomino-perineal removal of the rectum, he brings the end of the gut out. Here, however, I bring out a great deal more than is needed and leave quite a redundant mass protruding. The gut is split on the anti-mesenteric border as well as being open at the end. The flaps fold back and by and by become attached to the skin and there is a projecting mass. When a loop is drawn out, the incision is made lengthwise over the loop all the way from skin to skin. Then the edges turn back and after some weeks attach themselves to the skin margin. This method also leaves a projecting mass, and about this the colostomy bag fits very snugly. Such a loop never goes back into the abdomen and never yet has any of the fecal material gone down the efferent loop. If it is a temporary affair, when one is ready to close it, the clamp is applied to the projecting mass, it is cut off and a few days later an ordinary closure of artificial anus is performed.

In my method of procedure, the abdomen is opened through a left rectus incision from navel to pubis, a little more in fat folks. The liver is examined first, provided we are dealing with carcinoma. The tumor is examined and one decides what is to be done. Is there a carcinoma in the upper part of the pelvis? I will not attempt the removal of that until some weeks after I have done a colostomy higher up. And if colostomy is called for under such circumstances, I will use the transverse colon and draw it out through a separate incision high up. If the sigmoid is to be used, the incision is made medial to the anterior superior spine. The incision in the peritoneum is lateral to the incision through the skin. The incision through the muscle is of the McBurney type. In fact, the incision through the peritoneum I often make close along the left side of the root of the sigmoid and place the whole sigmoid extraperitoneal, taking care that its root is not tightly constricted as it comes through this peritoneal incision. The gut is brought out onto the surface. The length of gut outside the skin should be at least three or four inches. The gut is stitched through the peritoneum where it comes through it with catgut and to the various layers as well as to the skin, here and there a 20-day No. 0 or No. 1 catgut stitch. These never go into the lumen of the gut. After the loop has been drawn out and anchored, if there is any space between the outgoing loop and the lateral wall, this is obliterated. The abdominal wound is closed and the gut is not opened for some days. I do not believe it is well to try to make an emergency colostomy when the colon is very greatly distended as when an acute obstruction has supervened on a chronic one, and I shall always counsel against a cecostomy as a means of entirely diverting the fecal stream. It has its uses for other purposes, but if the large bowel be distended throughout so that it is dangerous to attempt to do a colostomy on it, I do a complete ileostomy and I bury a catheter in it and make sure that the intestines properly evacuate the gas. Aside from the difficulty of closing the distended abdomen, if it be closed and distention continue or increase, there will be a blow-out or evisceration at the site of the ileostomy. That also is most unpleasant.

Any patient coming to me whose condition, in my opinion, necessitates a colostomy, is given the names of patients who have had this operation done some time previously. He is asked to go and see these folks and then make up his mind as to whether he wants the same "done unto him." There are many patients upon whom I have performed colostomy, now more than twenty years ago, who are still my friends and who still maintain that under the same circumstances they would again have the operation performed, and they assure patients sent to them that the condition is not incompatible with cleanliness, comfort and happiness.

Dr. J. Shelton Horsley, Richmond, Va.—Dr. Rankin and Dr. Dan Jones have done much to make a permanent abdominal colostomy acceptable. Undoubtedly this is an essential procedure in excision of the rectum. When resection of a portion of the transverse or left colon is indicated, a temporary complete right colostomy or cecostomy through a McBurney muscle-splitting incision is helpful. A glass rod is placed under the colon just above the ileocecal valve, after bringing this segment of bowel freely into the wound. If there

is obstruction a catheter is inserted at once, after packing around the bowel. An incision is later made in the cecum and all of the fecal current is thus diverted from the distal lesion in the colon. The distal colon is irrigated twice daily from the colostomy and from the rectum. After about two weeks the resection is done, intra-peritoneal vaccine having been given a week before the resection. Two weeks after the resection the colostomy is closed. By this procedure I have been able to resect the rectosigmoid segment of bowel, in one case involving much of the upper rectum, and to make an end-to end union of the sigmoid with the stump of the rectum, and so avoid a permanent colostomy.

CONCERNING STOMACHS THAT ARE UPSIDE DOWN*

By D. A. RHINEHART, M.D.,
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In his recent book Barclay makes the statement that he has been increasingly impressed with the need of regarding the anatomy of the abdominal viscera as fluid, and he quotes Fell as saying that the whole abdomen merits the description of "a jumble of slithery things in a hole." Roentgenologists are familiar with such a conception; yet occasionally a variation is encountered that differs so much from the usual that it warrants description even if the subject has not symptoms that can be traced directly to the anomaly. Gross malposition of the stomach, particularly inversion, is an anomaly that belongs to this class.

In the living, the stomach, one of the "slithery things in a hole," varies from the anatomical textbook description more than any other viscus. The normal variations in size, shape, and position in different persons and even in the same person are such that a comprehensive description is difficult. In spite of this, gross abnormalities in position are exceedingly rare when there is no causal defect in the surrounding and supporting structures and are very uncommon even when produced by defects in the surrounding and supporting structures.

In 1924, LeWald reported two cases of thoracic stomach and mentioned two others, one from a dissecting room specimen, that had been reported by other observers. In these the stomach was a true thoracic organ with the diaphragm intact, the pylorus or duodenum passing through the diaphragm at the position of the usual esophageal orifice. Many more cases of intrathoracic stomachs from hernia of the diaphragm, either congenital or acquired, have been reported. If the defect in the diaphragm be large, or if the diaphragm be congenitally absent, the stomach while within the left half of the thorax is upside down or inverted.

In congenital absence of the left half of the diaphragm the stomach may be of the usual form and position, it may be inverted and in the thorax, or these two positions may be interchangeable.

As an example of this form, I had occasion to examine a white woman, aged 52, who was referred to me by Dr. A. W. Strauss. Her complaint was a feeling of heaviness after eating and a sensation of weight in the epigastrium. Eating aggravated her symptoms. Some relief was obtained by belching. She vomited occasionally. Because of a dull pain in the upper left part of the abdomen, she was unable to lie on her left side. These symptoms had existed for nine years. A physical examination showed a slight tenderness in the epigastrium and some hyperresonance in the lower part of the chest on the left side. This was more marked with the patient lying down.

The x-ray examination of this patient's chest showed old fibrous and calcified scars in the lungs from healed infection. At the first examination of her stomach it was in the usual position, extending from a level high in the left side of the abdomen downward and toward the right, with the pylorus and duodenal cap on the

Fig. 1
Case 1. Congenital absence of the diaphragm. Patient prone. Defect in the stomach caused by wrapping of the stomach around the large intestine.

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Fig. 2
Case 1. Patient prone. Stomach in approximately normal position.

right side of the third lumbar vertebra. A large, apparently permanent defect was found in the upper part of the greater curvature of the stomach. This extended into the stomach for a considerable distance, terminating in a rounded extremity (*Fig. 1*). It later was found to be caused by looping of the stomach around a part of the colon. Above and toward the left a pocket was formed that did not empty in the usual six-hour period.

The stomach was re-examined the following day. At this time the position was higher, the fundus reaching above the apex of the heart, with the pylorus and duodenum to the left of the tenth thoracic vertebra. A right-angle bend was found in the esophagus, and the defect in the stomach was gone (*Fig. 2*). At this time it was learned that the left arch of this patient's diaphragm was missing. By placing the patient in the Trendelenberg position, the stomach gravitated high into the left side of the thorax, reaching the level of the anterior end of the left second rib.

When the patient was restored to the horizontal position, it was found that the stomach had inverted itself (*Fig. 3*). The greater curvature reached into the left side of the thorax, the fundus was dependent, and the esophagus passed behind the duodenum to reach the cardia.

This patient had a stomach that could and did occupy at least three widely divergent positions. One of these was approximately normal; in one the stomach was upright, but looped around the colon, and in the third it was inverted. The diaphragm on the left side was undeveloped, yet she had lived to the age of 51 years with remarkably few and comparatively unimportant symptoms which were present but a part of that time.

There may be a large tear in the diaphragm permitting the stomach to enter the thoracic cavity. If the entire stomach be found within the chest, it will be upside down.

This condition was found in a retired railroad engineer, aged 69. He had been in a wreck seven years previously and had received a severe contused wound of the abdomen. At the time of his examination his symptoms were those of a peptic ulcer. Because of gurgling and splashing sounds within the chest, a paracentesis was done without obtaining fluid. An x-ray examination showed an inverted stomach within the left side of the thorax. He lived for thirteen years with this condition and died in October of this year at the age of 75.

Another patient was a white boy, aged 17, referred by Dr. Dewell Gann, Jr. He was examined because of symptoms suggesting attacks of acute and subacute appendicitis. He was under the average weight and had a poor appetite. He said that a small amount of food "filled him up." He was troubled with constipation.

At examination the stomach was found inverted and in the left side of the thorax, reaching to the level of the anterior end of the second rib. The greater curvature was in a sagittal plane, with the fundus posteriorly and the pylorus and duodenal cap anteriorly (*Fig. 4*). About five inches of the splenic flexure of the colon also were in the thoracic cavity, a constriction around the colon indicating the position of the remains of the diaphragm. After this was found, a history of an accident at the age of 12 was obtained.

Fig. 3
Case 1. Stomach inverted.

Fig. 4
Case 2. An inverted stomach in the left side of the chest from a traumatic hernia of the diaphragm.

He had been run over by an automobile, one wheel passing over his thorax and abdomen. He was confined to bed for weeks afterward. An x-ray examination at that time, probably of the ribs, spine and pelvis, was said to be negative.

This patient was operated upon. A rent in the left arch of the diaphragm that readily admitted three fingers was found. The colon and stomach were pulled from the thoracic cavity through the opening, and the defect closed. At a subsequent examination all the structures appeared to be normal; even the excursion of the left arch of the diaphragm had not been restricted by the trauma it had sustained.

Eventration of the diaphragm on the left side may be associated with an inverted stomach. In eventration the muscular tissue of the diaphragm fails to develop, the diaphragm consisting of a small amount of connective tissue covered with pleura above and peritoneum below. This structure has not the power of contracting, and it may be situated high in the thorax. If of extreme height, the stomach below it may be inverted.

Reports of malposition of the stomach from paralysis and elevation of the diaphragm following removal of the phrenic nerve have begun to appear in the literature. However, an inversion of the stomach has not been encountered.

One other type of inverted stomach has been reported. This apparently is a unique case.

The patient was a white widow of 65 years of age referred by Dr. J. H. Sanderlin. She was examined because of severe cutting pains in the upper right quadrant of the abdomen. She had had a mild generalized discomfort and uneasy sensations in the abdomen for twenty years. On examination she was found to have gallstones and an inverted stomach. In the erect posture the esophagus descended in the abdomen to the level of the second lumbar vertebra, where it entered the stomach. The greater curvature of the stomach was located under the left arch of the diaphragm and it contained a large gas bubble. The pyloric antrum extended downward and toward the right with the pylorus and duodenal cap anterior to the first and second lumbar vertebrae (*Fig. 5*). The diaphragm was intact and thicker than normally seen; it was located at the normal level, and its respiratory excursion was the equal of that of the opposite side. An unusual arrangement of the colon permitting the stomach to occupy this position was present.

This patient had a simple inversion of the stomach without a defect in the supporting structures to permit the inversion. During development the stomach must have turned forward on a transverse axis with the greater curvature passing forward and upward into the arch of the diaphragm, the fundus at the same time turning into a dependent position.

SUMMARY

In normal persons the stomach may have considerable variation in its size, shape and posi-

Fig. 5
Case 3. Inverted stomach with the diaphragm intact.

tion. Abnormal positions, of which inversion is one, are rare. Inversion of the stomach most often is due to a defect in the left side of the diaphragm. Congenital absence, congenital and acquired hernial openings of large size, eventration, and paralysis of the side of the diaphragm are associated with and are causal factors in inverted stomachs. A previously reported inverted stomach with an intact and normal diaphragm is mentioned.

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OBSTRUCTIONS AT THE BLADDER NECK IN INFANTS AND CHILDREN*

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The mastery of diagnosis and treatment of diseases of the urinary tract in infants and children has been the most outstanding and gratifying accomplishment which modern urology has attained.

The development and perfection of instruments of small caliber, the striking tolerance of infants and children to instrumentation when judiciously performed, and the cooperation of the pediatrician in seeking special investigation of the urinary organs in children, creates a trinity designed to exert a tremendous influence in the development of infantile and juvenile urology.

The sole function of the excretory ducts of the urinary tract is to deliver the accumulated urine without impediment. Unfortunately obstructive conditions along the urinary pathways are exceedingly frequent and take as their points of predeliction the normal physiological constrictions:

(1) The uretero-pelvic juncture

(2) The intravesical ureter

(3) The internal orifice of the bladder (this is the most frequent)

Stasis is a natural accompaniment of such obstructive conditions. The problem, therefore, resolves itself into one of hydrodynamics. These obstructive uropathies in infants contribute tremendously to infant mortality and should always be suspected in unexplainable cases of malnutrition, particularly if associated with urinary difficulties. Such suspicion may be confirmed by a determination of the nitrogenous constituents in the blood. If these are decidedly increased, a prompt urological investigation should be undertaken and the cause which is usually obstruction, should be removed at the earliest possible moment.

Bugbee and Wollstein found 117 congenital lesions of the urinary organs in infants in reviewing 4,903 necropsies performed at the Babies' Hospital in New York. Fifty per cent of these were due to some form of congenital obstruction. Thus 1.2 per cent of all the infant mortality occurred as a result of obstruction either with or without infection, the most frequent site being at the internal orifice of the bladder.

As a result of stasis, infection is to be expected and urinary infections in children are strikingly frequent. In the St. Louis Children's Hospital one in every 40 children either had such infections upon admission or developed them during the course of their stay. The majority of these were acute, the so-called acute pyelitis, usually secondary to some focal lesion elsewhere, the most common of which were middle ear, nasopharyngeal, pulmonary, intestinal or vaginal. Many of these acute conditions are cured following the relief of focal infections and the administration of urinary antiseptics and copious flushings. Such relief usually requires from one to three weeks. Urology at the present time is not serving its proper function with this type of acute kidney infection. Prompt ureteral catheterization with evacuation of the pelvic contents, followed by topical applications, as is currently employed in the adult, should be administered to protect the kidney substance from the ravages of infection squeezed back through it from the overcrowded pelvis, which is incapable of emptying itself. The inability of the pelvis properly to evacuate its contents is in most instances not due to a pre-existing stricture, but results from the acute inflammatory reaction with edema at the uretero-pelvic junction secondary to the renal infection itself, a self-engendered obstruction. The longer the septic contents are allowed to remain permeating the delicate structural mechanism of the kidney,

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such a vital organ to human economy, the more likelihood of late scarring and irreparable damage with the formation of the framework of chronic lesions, chronic recurrent pyelitis and stone formation for years to come. In a personal communication with one of my confreres, Dr. Drennen, who is consultant at a reformatory for boys in the State of Illinois, I am informed that the presence of unsuspected pus and infection in the urine and of albuminuria and hypertension are exceedingly common and in almost every instance there has been a preceding history of pyelitis in infancy.

Chronic infections of the kidney are the ones which the urologist usually observes and those which have resisted the orthodox medical administrations. Children with such infections are never in good health. They are either persistently toxic or are subjects of recurrent intermittent infections with febrile reactions. In both instances some mechanical obstruction previously alluded to is usually the cause and must be investigated. The persistence of medical treatment to these chronic infections was formerly due to lack of familiarity with the causative factors and to the failure of urology in offering material aid. At present, however, the remarkable curative results obtained through conservative surgical measures predict a brighter future for such afflicted subjects.

The clinical picture resulting from obstructions in the different portions of the urinary system may be very similar and the general physical signs may appear misleading; for instance, a child may present a large tender kidney and the whole symptom-complex revolve around this one organ and yet the cause of this may be an obstruction in the lower urinary tract with both ureters and kidneys involved with only one manifesting the disease.

For practical purposes, and as an aid to the clinician, there are certain simple diagnostic procedures which may be helpful.

(1) The determination of total renal function by tests of elimination such as phenolsulphonephthalein or through tests of retention secured through a determination of the blood for its nitrogenous elements. If the total functional capacity is low, as indicated by these tests, one may be assured that both kidneys are involved, regardless of the palpable evidences.

(2) The determination of the presence or absence of residual urine is highly important. If residual urine is present, it is usually indicative that the condition results from obstruction at the internal orifice of the bladder and is in all probability bilateral.

(3) The cystogram may afford valuable information in revealing the topographical outline of the urinary system. The fundamental lesion is at the bladder neck, if, upon filling the bladder, there is regurgitation up the ureters.

(4) Intravenous urography may be serviceable in delineating the outline of the urinary system, but in my experience it has not been entirely reliable. I have seen it demonstrate normal pelves when pronounced hydronephrosis was present and it is usually impossible to determine whether a dilatation of the ureter results from retention of excretion or regurgitation.

(5) Cystoscopic investigation of the urinary tract is usually necessary before any definite plan of corrective therapy may be satisfactorily applied and it is indeed gratifying that children tolerate cystoscopic manipulation admirably. Reactions are seldom observed; indeed, they occur far less frequently than with the adult, if the child is properly prepared. The infant or child with high residual urine and uremia requires the same special preliminary catheter drainage before such procedures are undertaken as is commonly employed in the adult. In hundreds of children whom I have examined, there has been but one serious reaction and this occurred many years ago in a child who was suffering from double chronic pyelitis without obstruction.

Anesthesia is required in only 35 per cent of the cases. If one is patient with these children, secures their confidence and allows the mother to be present with them during the examination, there is seldom any difficulty in making a complete urological investigation even in very young children without general anesthesia, and if general anesthesia is necessary it is applied for only a few moments during the instrumentation and should be removed as quickly as possible for functional studies and pyelographic determinations. The preponderance of girls over boys minimizes the necessity for general anesthesia, but even in very young boys such manipulations may frequently be consummated under local anesthesia.

Congenital valves and contractures at the internal orifice of the bladder are the most frequent causes of urinary obstruction in infants

and children. I wish to report a series of 28 cases of such obstructions:

ANALYSIS OF TWENTY-EIGHT CASES OF CONGENITAL VALVES AND CONTRACTURES AT THE INTERNAL ORIFICE OF THE BLADDER

Age	
Under 2	7 cases
2 to 5	9 cases
5 to 10	8 cases
Over 10	4 cases—57 per cent
Sex	
Males	14
Females	14

SYMPTOMS AND PHYSICAL FINDINGS

	Number	Per Cent
Frequency	15	53
Difficulty	8	
Incontinence	13	50
Pain and burning	7	
Hematuria	1	
Pyuria and pyelitis	20	71
Renal colic	3	
Uremia	9	32
Enlargement of kidney	6	(5 unilateral, 1 bilateral)
Residual urine	23	82
		Over 100 c. c. 14—50%
		Over 500 c. c. 3
		No residual 2
		No note 3

The lesions found at the vesical neck in this series of cases are as follows:

Contractures of neck	9	(4 boys, 5 girls)
Valves	14	(6 boys, 8 girls)
Valve and lobule	1	boy
Valve and bar	1	girl
Villous mass and valve	1	boy
Lobules	2	boys

Associated Conditions			
Relaxation of Sphincter	6		
Trabeculation	11		
Diverticulum	3		
Spina bifida	5		
Calculus	1		
Epispadias	1		
Double ureter	3		
Regurgitation	14	Bilateral	9
		Right	3
		Left	2

REGURGITATION WITH RESIDUAL URINE

Over 200 c. c.	6
With small residual	8
With contracted neck	7
With valves	7

The importance of regurgitation of the vesical contents into the ureters and kidney pelves cannot be overestimated. It was present in 46 per cent of these cases. One-half of these occurred in the presence of a high residual urine, the remaining half with small residuals. It is evident, therefore, that the presence of a high residual is not essential for the creation of regurgitation. Stiffening and retraction of the ureterovesical valve resulting from infection is fundamental. I have observed incompetency of the ureteral valves with large regurgant ureters in several patients before operation; after the relief of obstruction and subsidence of infection these became competent and regurgitation did not occur.

Operations.—Operations were performed on 18 of these children, sixteen cautery punches and two suprapubics. Eight were for valves, 1 for valve and bar, 7 for contractures of the vesical neck, and 2 for lobules. The child's punch was used in 9 instances and the baby punch in 7. The remainder were not operated upon for three reasons: local treatment afforded relief, the parents refused operation, or the patients were not thoroughly prepared.

Preliminary Treatment.—All of these little patients who carried residual urine and who showed evidence of urosepsis were treated in a manner similar to that used for prostatics, by preliminary indwelling catheter drainage, copious flushings and urinary antiseptics, oftentimes by the administration of subcutaneous saline and intravenous glucose and occasionally by transfusions until their condition appeared sufficiently satisfactory for any type of surgical operation. This type of preliminary treatment is just as important in children as it is to the prostatic. The operation is never performed until the nitrogen is normal, the febrile reaction has subsided and the general appearance of the child is good.

Technic of Operation.—The punch with its

Fig. 1

Congenital valves at the bladder neck; notice funneling. Diverticulum of bladder. One hundred c. c. residual. No regurgitation of ureters. Symptoms of urinary obstruction. Incontinence of urine. Cured with baby punch.

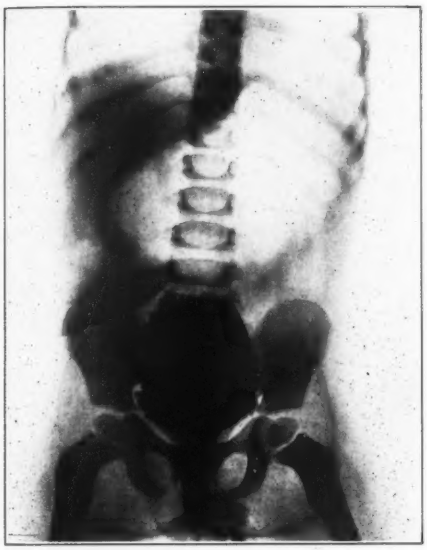

Fig. 2

Contracture and valves of vesical neck. Cellules of bladder. Bladder symptoms. Incontinence of urine. Cure following removal of obstruction by means of baby punch. Three bites, one each lateral valve, one median for contracture.

obturator is passed into the bladder, which has been previously filled with sterile water or boric. In infants, the baby punch, a No. 14 French size, is used, and in larger children the child's punch, a No. 18 instrument, is employed. Following the introduction of the instrument the obturator is removed and the instrument gradually withdrawn until the water ceases to flow. One is then assured that the vesical orifice is within the slot of the instrument. Previous cystoscopic examination has determined the exact nature of the obstruction, and if it is a contracture of the neck, the slot of the instrument is brought out in the mid-line below. The eyepiece of the instrument is lightly elevated, steadily securing the obstructing orifice within the slot, the tube is evacuated and dried with a cotton pledget, the orifice is visualized by reflected light and the working element carrying the cautery blade is passed through the sheath of the instrument until it engages the obstruction. Heat is then turned on and by a rotary motion the obstructing band is punched out. The instrument is then removed unless further destruction of tissue is deemed advisable. At times three bites are removed, seldom more. In case more bites are required, the instrument is reinserted into the bladder, water allowed to flow, the orifice grasped again lateral to the previous bite at 5:00 or 7:00 o'clock on the dial and the procedure repeated.

In cases of valves, which are always lateral, the instrument is inserted in the same manner, but the slot of the instrument is pressed toward the side from the band of which the operator expects to remove a central section, the eyepiece of the instrument passing in the opposite direction until a hang is felt and the water ceases to flow. The same process of removal is undertaken. Usually in valve cases only two incisions are necessary, one on each lateral valve.

In none of these cases operated upon by the punch has there been the slightest bleeding. A small indwelling catheter is inserted for 24 hours. There has never been a postoperative hemorrhage and in only one instance was there the slightest febrile reaction. These children have tolerated such operations much better than the adult. No complications have occurred. The operation is of course delicate and heavy pressure must not be exerted for fear of cutting too deeply. With light cauterization there is no danger of deep penetration of heat with the creation of slough beyond the field of operation. The high frequency current as a means of resec-

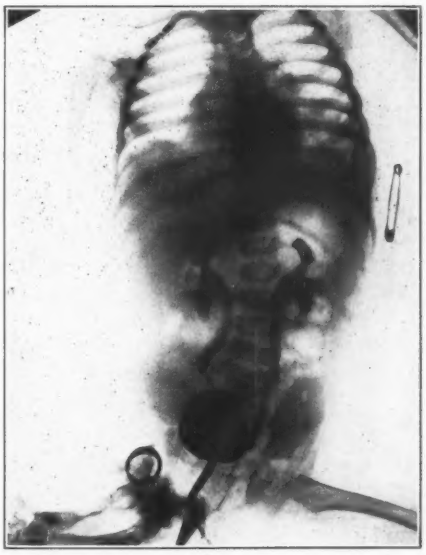

Fig. 3

Recurrent pyelitis. Sixty c. c. bladder residual. Contracture of vesical neck (notice clean cut line at orifice of bladder). Regurgitation up the ureters. Cured with baby punch.

Fig. 4-A
Contracture of vesical neck. Regurgitation of right ureter. High residual. Left ureter did not regurgitate.

tion would be extremely dangerous in tissues so thin and delicate.

The after care consists in accurate supervision, daily passing the catheter for vesical instillation of some mild germicidal solution and for the determination of the emptying ability of the bladder. If the bladder empties completely all instrumental manipulation ceases. If some residual remains as a result of edema, catheterization and instillation continue until it entirely disappears. If within ten days the urinary function is not normal and residual is still present, the child is re-examined and another operation performed. This has been necessary in only two instances.

The two suprapubic operations were performed a number of years ago, before the baby punch was perfected, and are not necessary at the present day. Since these obstructive conditions in children are either from contractures or valves there should seldom, if ever, be the necessity for an open operation for their removal.

Results.—Fifteen of the operations have given perfect results; two, decided improvement, but they are not completely satisfactory. The parents refused to allow further surgical procedures. One case was not improved. This was a patient with pronounced spina bifida with a very thin delicate valve. The removal of the valve gave no benefit.

The results following the removal of the obstruction through the urethra in children by means of the punch have been the most gratifying I have ever had in surgery. The end results have been exceedingly satisfactory. Invalid children have been restored to excellent health by such a simple procedure with practically no complications or untoward effects and with no mortality. There have been several cases so striking in the series that they are worthy of special mention.

Case 1.—A boy 9 years of age had had a meningocele removed when he was a baby. The local result was excellent, but he had been incontinent all of his life and had worn a rubber urinal. Numerous urologists whom his family consulted in his behalf expressed the opinion that the bladder incontinence was due entirely to the nerve lesion. When I examined this child he had a typical neurogenic bladder, that is, a markedly relaxed internal sphincter which allowed visability of the whole posterior urethra. There was a residual urine of 8 ounces. On close cystoscopy study I observed two small valvular folds running from the internal orifice of the bladder out to the region of the verumontanum. These were resected in their central portion by the baby punch. The child immediately began voiding a better stream and within a month had discarded his urinal, his urinary function was perfect and has remained so for the three years that I have followed him.

Case 2.—A girl of 6 had 300 c. c. residual urine, marked regurgitation and tortuosity of the ureters and

Fig. 4-B
Infected hydro-ureter. Obstruction intravesical ureter. Obstruction relieved at bladder neck with baby punch. Left ureteral orifice being dilated. Coincident pyelitis relieved.

Fig. 5

Chronic pyelitis. Uremia. Large hydro-ureters. Contracture of vesical neck. Long-continued preliminary drainage. Removal of obstruction at vesical neck with baby punch. Complete cure with restoration of health.

dilatation of the renal pelves. I have watched her for a number of years and have made the striking observation of re-coaptation of the uretero-vesical valve. This child at present shows no regurgitation up the ureters after marked distention of the bladder. She had suffered with chronic pyelonephritis since infancy and is now entirely well except for a slight bacteriuria.

Case 3.—A girl of 5 showed 600 c. c. residual, tremendous dilatation of the ureters and renal pelves and marked uremia. She had suffered with and been treated for chronic pyelonephritis since infancy. She has been entirely well for three years following the removal of but one section of tisssue from the mid-portion of a vesical neck contracture.

Case 4.—A boy of 4½ years of age was observed during the past year. He had suffered with pyelitis since infancy and had been treated constantly by qualified pediatricians. He was desperately uremic, carrying a nitrogen retention of 90 mg. in the blood. There was a dirty residual urine of 350 c. c. He required preliminary catheter drainage for three months. Cystoscopic examination showed, with only local anesthesia, a contracture of the vesical neck. Cystogram revealed a tremendous bladder, both ureters regurgitant, and over an inch in diameter. The renal pelves were tremendous. The x-ray photo of the completely filled bladder, ureters and kidney practically covered the entire abdomen. Within 24 hours after the removal of the obstruction by means of the punch the child voided 8½ ounces, whereas he had previously never voided over 2 ounces at a time. Within a month the urine was perfectly clear and he was emptying his bladder completely. He has gained 6 pounds in weight and is entirely well (*Fig. 5*).

Case 5.—A girl 26 months old had been a subject of recurrent febrile attacks for many months. Pus and bacilli had been found in the urine constantly, but there were no bladder symptoms. She had been examined elsewhere and a double ureter and renal pelvis were found on the right side with infection in the upper pelvis. Heminephrectomy had been advised. My examination revealed an obstruction at the orifice of the bladder due to valves, retaining three ounces of residual urine. The orifice of the ureter which drained the infected portion of the kidney was regurgitant. Following the removal of the valvular obstruction at the bladder neck with the baby punch, the residual urine disappeared and with it the infection in the kidney pelvis. This case shows the absolute necessity of observation of the nature of the ureteral orifice, determination of residual urine, and of the cystogram.

After the relief of obstruction and free drainage afforded through normal bladder emptying, the ureters will usually empty themselves completely. In some instances repeated ureteral catheterizations are required in order to applicate the ureters topically and hasten resolution. I have never seen a case that did not empty sufficiently, in spite of the large tortuous ureters, to insure relief of absorption. Periureteritis with fixed angulations seldom occurs in infants and children. With the proper relief of obstruction from below, absorption of peri-ureteral inflammatory reaction will usually result as the infection recedes and I see no indication for the extensive ureteral plastic operations such as freeing both ureters, straightening out angulations and resecting several inches of the duct requiring anastomosis. This operation is extensive and serious and misses the point entirely. It is designed to treat the effect and not the cause and hence should have no place in this class of case.

I urge the profession to suspect such mechanical causes in the majority of persistent or recurrent cases of pyelitis in infants and children, and to seek early investigation of such cases so that prompt corrective measures may be applied.

I can sincerely recommend the cautery punch operation for the removal of the obstructions at the bladder neck in infants and children. The procedure is delicate, but strikingly simple. It has been entirely free from complications such as hemorrhage and reactions. There has been no mortality and the results have been immediate, durable and most gratifying. It should entirely supplant any major surgical procedure.

The recovery of these children and their restoration to health following such a simple surgical procedure is the most striking accomplishment I have ever observed in surgery.

ROENTGEN RADIATION IN THE TREATMENT OF MALIGNANT DISEASE*

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No single plan of roentgen irradiation is suitable for the treatment of all patients with malignant disease. Each case must be individualized, and a variety of different factors considered, before any given scheme for delivering radiation is begun. Furthermore, the contemplated treatment of a particular neoplasm may include other methods that will influence the administration of roentgen rays. For example, if x-rays are combined with surgery or radium, the plan of roentgen treatment may be different from one that might be followed if x-rays were employed alone. It is impractical to attempt to enumerate all of the various conditions with which one is confronted in planning radiation treatment. However, for illustrating the variation in the schemes used for delivering high voltage roentgen ray therapy, a few of the more important factors influencing the method of administration, and the amount of radiation employed, will be considered.

It is always desirable to deliver radiation in a manner that will produce as small an amount of damage to normal tissues as is consistent with adequate irradiation of the tumor-bearing region. The reaction produced in normal tissues finally limits the amount of radiation that may be given, and the damage to any healthy structure must not exceed a degree from which it will be unable to recover. The skin is of particular importance when external irradiation is employed. For any particular beam of x-rays the dose delivered to the skin surface is always greater than the amount of radiation reaching any given depth in the underlying tissues. It is usually impossible, therefore, to treat a tumor adequately through one irradiated area alone because of the severe reaction that would occur in the skin. If several skin areas are used, and the radiation directed toward the tumor-bearing region, each beam will contribute to the total dose delivered to the neoplasm. By this means it is sometimes possible to increase the amount of radiation reaching the tumor to such a degree that it will actually exceed the dose delivered to any given skin field. The number and arrangement of the various areas to be irradiated depends upon the anatomical relations of the tumor, and the dose that is considered necessary for control of the disease.

The use of several irradiated areas is not only important for delivering greater doses to the tumor-bearing region without over-irradiating the skin surfaces, but also in influencing the distribution of radiation through a given volume of tissue. That is, a particular arrangement of fields may be employed, with the various beams directed in a certain manner, that will deliver a distribution of radiation suitable to the treatment of the neoplasm, without exposing adjacent normal structures to excessive doses. In the roentgen irradiation of cervical cancer, for example, there are certain procedures that can be followed, which will accomplish these objectives in most patients. Data for these procedures were given in a previous paper,[1] in which diagrams were published showing the distribution of radiation within the average female pelvis for several different arrangements of skin fields. If radiation is delivered through large single fields on the anterior and posterior pelvic surfaces, both the bladder and rectum receive greater doses than the cervix. The amount of radiation delivered to a portion of the parametrial regions will be a slightly lesser dose than that obtained in the cervix. The distribution of radiation can be altered considerably if two skin portals are used on the anterior surface, two on the posterior, and one on each lateral aspect of the pelvis. By this means doses delivered to points throughout the pelvis are increased, and a distribution of radiation is obtained that is more suitable to the treatment of cervical cancer. The anterior and posterior fields are separated by a distance of 2.0 cm. in the mid-line. Each beam is directed straight toward the underlying parametrial region, and not tilted toward the mid-pelvis. From this procedure both the bladder and rectum are spared doses in excess of the amount delivered to the cervix. Lateral beams do not contribute much radiation to structures at a depth as great as the middle of the pelvis, but they do increase the total dose obtained in the parametrial regions to such a degree that it actually becomes greater than the full amount of radiation delivered to the cervix. This is particularly desirable because it is impossible to control the disease located at a distance of more than 3.0 or 4.0 cm. from the cervical canal by means of radium applied to the cervix alone.

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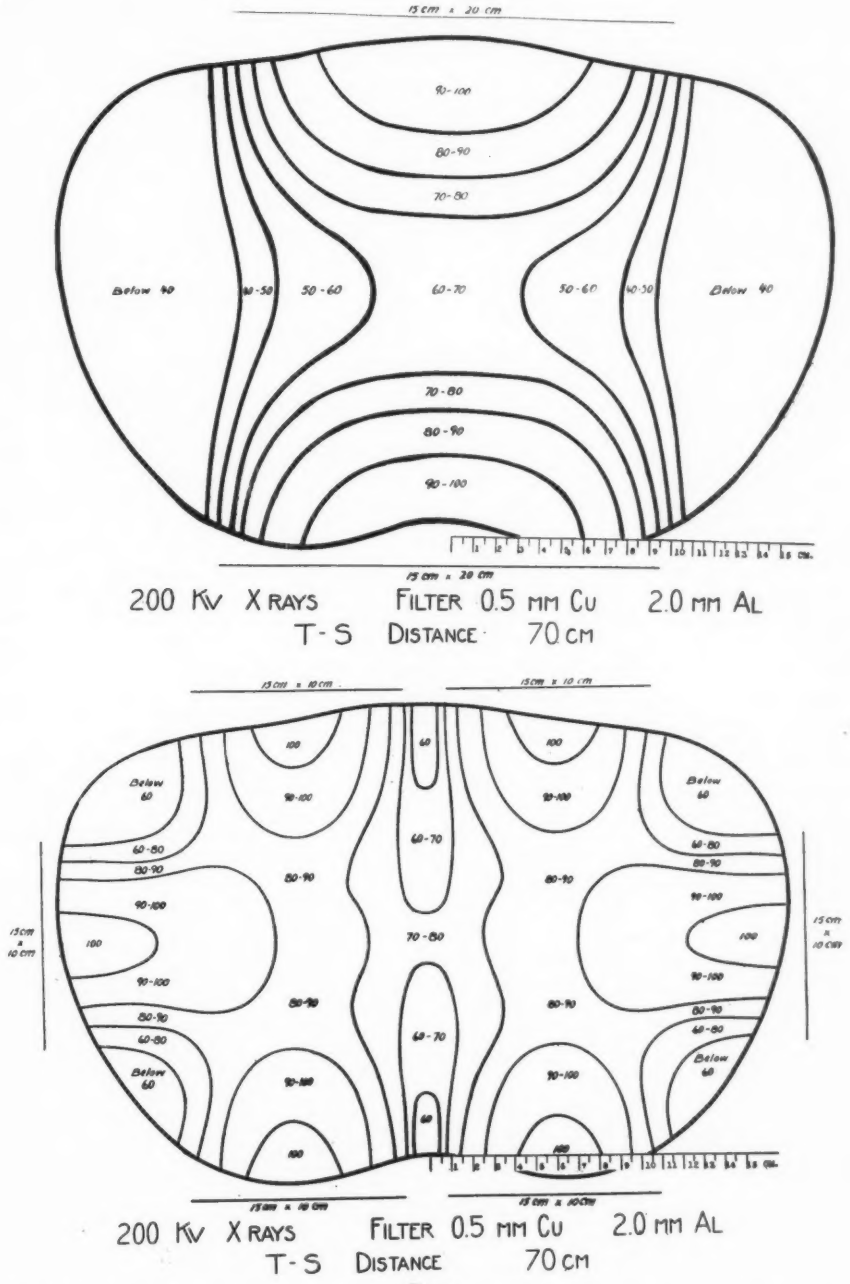

Fig. 1

Distribution of radiation within the average female pelvis for large single fields (each measuring 15x20 cm.) on the anterior and posterior surfaces, and for six fields arranged in the manner shown (each measuring 15x10 cm.).

The methods by which external irradiation may be administered can be divided into three fundamental types. These are the so-called massive, saturation, and divided dose technics of treatment. In the massive dose method the degree of radiation effect to be produced is obtained by means of a single exposure. When this method of treatment is employed, it is usually intended that the dose shall be repeated one or two times, at such intervals as are necessary for control of the disease, and justified by the condition of the skin and other normal structures. The time elapsing between exposures is usually about six weeks.

The saturation dose method is one in which a certain radiation effect, that has already been produced in the tissues, is maintained for a period of time by the addition of small doses. Each additional dose is intended to produce a degree of radiation change equal to that which has been lost by recovery of the tissues since the last treatment. A technic for maintaining irradiated tissues in a state of saturation was first described by Kingery[2] in 1920. His clinical observations were conducted upon patients treated with unfiltered rays of a "soft" character. By experimentation upon patients the time was determined at which various percentages of a dose that had been given to the patient could be repeated. The rate of depreciation in radiation change was expressed by means of a semi-logarithmic curve. Pfahler[3 4] and Weatherwax[5] extended the work to include "hard" x-rays. They found that the rate of loss in biologic effect progressed at a lesser velocity for "hard" radiation than for rays of a "soft" character. For high voltage x-rays they noted a 50 per cent loss twelve days after the first exposure. In a similar study Stenstrom and Mattick[6] found that a 50 per cent loss occurred eight days after treatment for the same quality of radiation. Additional data upon the recuperation of human skin following irradiation have been presented by Duffy and co-workers,[7] in which the degree of radiation change was standardized. For this purpose the so-called "threshold erythema" was employed, which has been defined by Quimby[8] as representing an amount of radiation which will produce a visible reddening of the skin within four weeks after the exposure in 80 per cent of the patients receiving the dose, and no visible reaction in the remaining 20 per cent. For certain specified conditions the threshold erythema dose for a single exposure was found to be 525 roentgens. To produce the same degree of skin change by delivering two equal amounts of radiation 24 hours apart, it was found that 400 roentgens were required at each exposure. For equal doses given 48 hours apart, 425 roentgens had to be delivered at each of the two exposures. From these data the rate of recuperation from certain doses of radiation was found to be greater during the first 24 hours following the exposure than during the second 24 hours. Not only was the rate of recovery from skin damage found to be greater than had been noted by other observers, but also it was not of a velocity that could be expressed by means of a semi-logarithmic curve. For the doses considered, the skin recovered 69 per cent of the immediate damage in 24 hours and 76 per cent in 48 hours. The conflicting results illustrate the difficulty in maintaining any accuracy in an attempt to keep irradiated tissues in a state of saturation.

The divided, or fractional dose technic, is being used in a number of clinics, and has been called the Coutard method of treatment. Multiple exposures are delivered to the various irradiated areas over a protracted period of time. Each dose consists of an amount of radiation that is intended not only to replace the degree of change that has been lost through recovery of the tissues, but also to increase the existing biologic reaction. The total number of fields to be treated will vary with different conditions. Exposures are usually given to one or two areas each day. The frequency at which treatments are delivered to a particular skin portal will depend upon the number of fields to be irradiated, and the number of exposures given each day. Complete treatment usually requires from two to three weeks. The total dose delivered to a given field may vary from an amount of radiation sufficient to produce a mild erythema, to a dose that will cause considerable damage to the skin. The degree of reaction occurring in the skin for any given dose is partially dependent upon the rate at which radiation is administered. A large dose delivered over a long period of time might not produce any more severe reaction than a lesser dose delivered over a shorter time. If a severe degree of skin damage has been produced by a course of divided dose treatment, it is not practical to administer radiation through the same fields at a later date, even if additional treatment is considered necessary.

In planning the radiation treatment of a particular neoplasm, the variety of tumor under consideration is of importance for determining the total dose to be delivered. Lesions of a

radiosensitive character will show a greater degree of change for a given amount of radiation than radioresistant types. Data upon the sensitivity of various tumors have been published by Stewart,[9] Ewing[10 11] and Desjardins.[12] Tumors arising in lymphatic structures are much more sensitive to radiation than those of osseous or nerve tissue origin. Most epithelial tumors are of a degree of sensitivity between the two extremes just mentioned. The fact that radiation is delivered over a period of several days is considered an advantage in both the divided dose and saturation technics of treatment. By this means there is a greater chance that tumor cells will be irradiated during certain phases of their activity. It may be that cells are more sensitive to radiation at different periods of their development.

The dose delivered to a tumor may be calculated for any given instance. However, the degree of accuracy in such a procedure is not perfect. Under any circumstance the estimation of tissue dose is only approximate. For considering both roentgen and radium sources of treatment, some unit must be employed for expressing doses delivered by the two different types of radiation. The so-called threshold erythema dose serves very well for this purpose. By determining the tissue dose delivered to a particular variety of neoplasm in a number of different patients, data may be obtained upon the amount of radiation required for producing a lethal tumor effect in most instances. Martin, Quimby and Pack[13] have reported that 7 to 10 skin erythema doses represent a lethal amount of radiation for intra-oral adult squamous carcinoma if delivered within ten to twenty days. Transitional cell carcinoma (Ewing), or lymphoepithelioma (Regaud), on the other hand, requires from 2 to 4 skin erythema doses if delivered within the same time interval. Healy and the present author have estimated that control of the primary lesion in cancer of the cervix requires a minimum dose distribution of at least 6 to 8 threshold erythemas.[14] The time required for complete treatment of most of the patients upon whom these data were obtained was about eight weeks. The routine treatment consisted of a pelvic cycle of roentgen radiation given seven to ten days before the application of radium to the cervix. Six weeks after the radium treatment the cycle of external irradiation was repeated. It should be noted that most of the radiation delivered to the primary lesion was by means of radium applied to the cervix, which was administered over a relatively short period of time. The cycle of roentgen radiation given six weeks after the radium treatment did not influence greatly the changes taking place in the cervix. Therefore, in estimating the lethal dose to be 6 to 8 threshold erythemas, the time within which this amount of radiation must be delivered is probably about ten to fifteen days.

For illustrating the changes that can be noted clinically in skin and tumor tissue from specified amount of radiation, it is desirable to consider individual patients. Two cases with adult squamous lesions will be discussed and one of transitional cell carcinoma. For considering the histologic evidence of radiation effect, changes that have been noted in cervix cancer will be mentioned. In each instance the treatment will be described briefly. Doses expressed in roentgens pertain to measurements in air.

In *Fig. 2* is shown the photograph of a patient with lingual cancer. The lesion was located on the right side near the base of the tongue and measured about 3.0 by 4.0 cm. Biopsy revealed an adult squamous carcinoma. There was a node 3.0 cm. in diameter in the right neck. Radiation was directed toward the primary lesion through three skin portals. A field was used over each angle of the jaw, and one between the rami of the mandible. Each area received ap-

Fig. 2

Carcinoma of tongue before and after treatment. Center photograph shows skin reaction from roentgen treatment

Fig. 3
Skin reaction following roentgen treatment for carcinoma of the larynx.

proximately 2,900 roentgens over a period of 29 days. For each field the skin reaction was of a degree necessitating the use of vaseline dressings. The patient's greatest complaint was dryness and soreness of the mucous membranes in the mouth and throat. The primary lesion received about 8 threshold erythema doses. There was complete regression of the disease in the tongue. The node in the right neck was included in the beam incident upon that surface. The node may be estimated to have received about 5 threshold erythema doses. Regression was marked, but not complete in this region. Shortly after the treatment was completed the patient developed a cough. A radiograph taken at that time revealed the presence of pulmonary metastases. The lung fields were irradiated with much smaller doses than had been used in the treatment of the primary lesion. There was no apparent regression. The patient expired four months after the primary treatment.

In *Fig. 3* is shown a photograph of the skin reaction occurring in a patient treated for carcinoma of the larynx. The vocal cords had been destroyed and the air passage narrowed to such a degree that it was necessary to perform a tracheotomy. Biopsy revealed a well differentiated squamous cell carcinoma. Treatment was given through two skin fields. One was situated on the right side of the neck and the other on the left side. A total dose of 3,000 roentgens was delivered to each area over a period of 25 days. The degree of reaction occurring in the skin was more severe than had been noted in the patient mentioned above. In scattered foci the destruction was sufficient to cause bleeding. However, the skin healed perfectly after the application of vaseline dressings for a period of about ten days. There was considerable discomfort from the reaction occurring in the mucous membranes. The tumor may be estimated to have received from 7 to 8 threshold erythema doses. Regression was complete and the patient has remained free of disease. It has now been nine months since the treatment was completed.

In *Fig. 4* is shown the photograph of a patient who received treatment for a metastasis from a transitional cell carcinoma. The metastatic mass measured about 10.0 cm. in diameter and involved the entire submaxillary region on the right side of the neck and extended past the mid-line anteriorly. Biopsy was taken from a small area of ulceration located on its inferior surface. The disease had metastasized to a number of different areas, so that treatment could be palliative only. The mass in the neck was of the greatest importance to the patient because of the interference it offered to movement of the head. For this reason it was irradiated before other regions were treated. Radiation was delivered through three skin fields. One was situated on the anterior surface of the neck mass, through which 2,000 roentgens were delivered over a period of 22 days. The other fields were situated on the lateral and medial surfaces of the mass, but received only 500 and 1,000 roentgens, respectively. The discrepancy in the doses delivered to the various skin areas was due to the rapid regression of the metastasis. After a few treatments it was possible to irradiate the entire mass through the anterior field alone. The skin reaction was not severe. There was some destruction of the epithelium around the small area of ulceration that

Fig. 4
Metastasis from transitional cell carcinoma before and after roentgen treatment.

was present on the inferior surface of the mass before treatment was begun. The dose delivered throughout the metastasis may be estimated to have been from 2 to 4 threshold erythemas. There was marked regression, but at no time was it complete. Other regions were irradiated, but the patient became incapacitated and expired 11 weeks after the onset of treatment.

Despite the fact that both the first and third patients died within a short time following treatment, the clinical evidence of regression that was noted can be used for considering the effect of different amounts of radiation upon certain types of tumors. For all of the patients mentioned, the treatment was delivered over a period of three to four weeks. In the cases of tongue and larynx cancer, the primary lesion received about 8 threshold erythema doses. The patient with the large metastasis in the right side of the neck had from 2 to 4 threshold erythema doses delivered throughout the mass. The lesions that received the greater amount of radiation were well differentiated squamous carcinomas. The metastatic mass that received a lesser dose was from a transitional cell carcinoma. In each instance there was a marked degree of regression. The doses that these patients received compare favorably with the amounts or radiation that have been specified as representing lethal doses for similar types of lesions.

The histologic changes noted in cancer of the cervix from specified amounts of radiation have been described in previous papers.[15 16] Biopsies were taken from the primary lesion in a number of different patients during a course of roentgen treatment. The changes that were noted in the various specimens were produced by roentgen radiation alone, since radium was not applied until external irradiation had been given. In several instances about 4 threshold erythema doses were delivered to the primary lesion within a period of four weeks. There was considerable variation in the appearance of different specimens taken from the same tumor. Biopsies taken from various parts of the tumor before treatment also showed differences. However, there were certain changes following the administration of radiation that were more or less constant in most instances. Histologic alterations were observed in the tumor within a few days after the beginning of treatment. The earliest manifestation of radiation effect was an increase in the plasma cell infiltration, and a decrease in the evidence of any existing inflammatory process. As treatment was continued the tumor cells became swollen and vacuolated. Nuclei were degenerated and hydropic in appearance. Fibrosis developed and blood vessels were obliterated. By the time roentgen treatment was completed, many of the specimens contained only scattered foci of degenerated, hyalinized tumor. In a few patients biopsies entirely free of carcinoma were obtained. However, in the latter instance, specimens taken ten to fourteen days after the last dose of radiation always showed actively growing tumor, if radium had not yet been applied to the cervix.

The reappearance of viable tumor after a primary cure had apparently been obtained was due to the fact that a sub-lethal dose had been delivered. Therefore, a tissue dose of 4 threshold erythemas delivered over a period of four weeks is not sufficient to control the disease. These data are important for illustrating amounts of radiation that are below the dose required to produce a lethal tumor effect. It has already been stated that the lethal dose for cancer of the cervix is probably about 6 to 8 threshold erythemas.

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ROENTGENOGRAPHY OF THE LARYNX AND PHARYNX*

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On films of the normal neck the following structures are readily recognized and identified, namely: the tongue, uvula and soft palate, hyoid bone, epiglottis, pharynx, vallecula, pyriform sinuses, ventricular space, the various cartilages comprising the larynx, the trachea and the retropharyngeal, retrolaryngeal and retrotracheal soft tissue spaces. The paired structures are superimposed. The lesser horns of the hyoid bone are inconspicuous and usually cannot be identified. The greater horn, however, is usually quite conspicuous. The arytenoid cartilages are usually readily recognized as small triangular shadows situated along the posterior border of the larynx and rarely exhibit any appreciable degree of calcification. The thyroid cartilage up to the age of puberty is quite indistinctly outlined in either of the sexes. After puberty the thyroid cartilage in the male develops more prominently and usually calcium deposits within it are quite conspicuous. Its distribution is quite irregular, but usually most dense at the junction of the anterior and lower border, the calcification becoming more prominent with increasing age. Lime deposits in the thyroid cartilage of the female are usually quite inconspicuous. The cricoid cartilage forms a shadow well below the glottis, usually wider posteriorly; and in the female after the age of 20, calcification along its posterior border is usually fairly prominent, becoming more marked with increased age so that it is possible to estimate the approximate age and sex from the appearance of the laryngeal cartilages. The trachea is readily identified and usually the position of the tracheal rings is faintly indicated; and occasionally calcification of these rings may render them quite prominent. The posterior border of the trachea is quite parallel to the anterior margin of the cervical spine, and the retrotracheal soft tissue space is of uniform thickness, but considerably thicker than the retropharyngeal soft tissue space.

These various structures can be rather readily recognized on the fluoroscopic screen by the well accommodated eye, and, in addition to the morphology of the usual normal structures or alterations produced by various pathological processes, movements produced by phonation and swallowing and change in position of these structures as a result of muscular action may be studied. Obviously such an observation is of great value in the study of paralysis of the muscles of the pharynx such as occurs, for instance, as an early sign in chronic progressive bulbar palsy and serves as a means of differentiation between the difficulty in swallowing due to bulbar palsy and that due to actual obstruction. During the act of swallowing the tongue is seen to move forward and the soft palate is elevated to close off the nasopharynx and the epiglottis is held against the dorsum of the tongue. At the same time the larynx is markedly elevated, particularly the arytenoids, which rise upward against the posterior and inferior surface of the epiglottis, which effectually closes off the air passages, and during the peak of the act the shadow of the arytenoids and the epiglottis are confluent. The hyoid bone is also considerably elevated during this period. As the food enters the esophagus and the pharynx becomes emptied by a peristaltic action of the muscles of the phar-

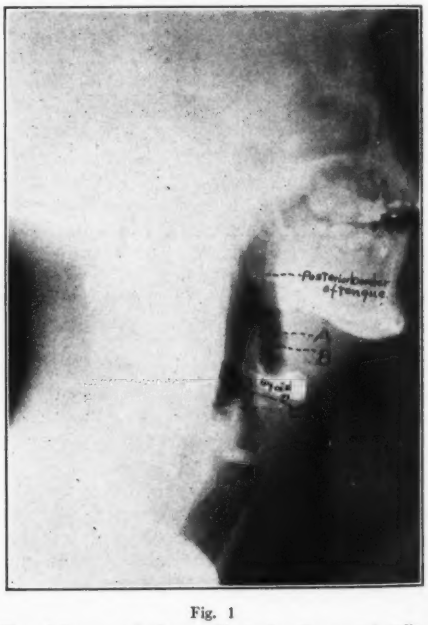

Fig. 1

Normal larynx and pharynx illustrating the normal radiological anatomy of this region. A—Epiglottis; B—Epiglottic valleculae; C—Aryepiglottic folds; D—Arytenoid cartilage; E—Ventricle; F—Thyroid cartilage. The retropharyngeal soft tissue space is thin and uniform and parallel with the cervical spine. The retrotracheal soft tissue space is thicker, but uniform and parallel to the spine.

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Fig. 2-A

Carcinoma of the pharynx. A large nodular mass of irregular but sharply defined outlines is seen in the region of the epiglottis which obliterates the epiglottic vallecula and appears to fill the upper pharynx. The ventricle is linear in shape and distorted. The inferior limits and extent of this growth could not be determined by direct examination.

ynx, the larynx and hyoid bone descend and the arytenoids separate from the epiglottis. At the completion of the act all of these structures have returned to their original position.

In the presence of a bulbar palsy with paralysis or weakening of the pharyngeal muscles, there is, of course, a stasis of food or barium mixture in the pharynx. In the milder instances, the barium mixture may be seen to delay or accumulate in the region of the valleculae and the pyriform sinuses, from where it may trickle down into the air passages, thereby producing a spasm of the glottis and an attack of choking or coughing, all of which is readily seen on the fluoroscopic screen; and films may be secured with a small barium residue in the valleculae and the pyriform sinuses. As the course of the disease progresses, material swallowed by the patient more easily passes into the respiratory tract with a very sluggish movement of the structures as described during the act of swallowing.

The various inflammatory conditions which may affect the pharynx and larynx alter considerably the usual appearance of this region, depending on the extent and the severity of the condition present. The roentgenogram may be of particular value in demonstrating the complete extent of an inflammatory process which might otherwise be quite difficult or almost impossible to obtain.

Tuberculosis of the larynx may produce a fairly characteristic appearance. The ventricle is usually completely obliterated, but in the milder types of such disease the ventricular cavity may be narrowed and distorted or irregular and hazy in outline, due to the edema of the surrounding soft tissue structures. This is usually accompanied by an edema and swelling of the arytenoids, which appear much more prominent, and a distortion of the base of the aryteno-epiglottis fold. With a further spread of the inflammatory process and an increase in its severity, the edematous swelling of the aryteno-epiglottis fold increases and swelling of the epiglottis appears, which may become greatly thickened, partially or completely obliterating the vallecula. In the advanced or severe cases with increased edema of the soft tissues, the air space of the pharynx is greatly decreased and in the most severe cases may appear to be almost completely obliterated. With the appearance of ulceration, irregularity in the contour of the region so affected may be readily demonstrated and

Fig. 2-B

Condition four months after deep x-ray therapy. The carcinomatous mass has completely disappeared and the tissues are returning to a more normal appearance. Considerable edematous swelling of the pharynx and larynx persists. Note the prominence of the thyroid cartilage indicative of a male of moderately advanced age.

Fig. 3

Benign pear-shaped tumor arising from the region of the arytenoid cartilage, mechanically distorting the normal shape of the pharynx. Note the greatly dilated ventricle. The site of origin and size and shape of this large mass could not be determined by direct examination, which is clearly portrayed on the x-ray film.

such a finding would differentiate the ulcerative from the non-ulcerative type of inflammation.

Other inflammatory conditions such as diphtheria, syphilis, and non-specific laryngitis, may produce rather similar findings, but usually involve a smaller area, the changes are less pronounced, and the non-specific infections tend to remain localized to the larynx. Swelling of the lining membrane of the trachea may produce demonstrable narrowing of the air column of the trachea. Stenosis of the pharynx or trachea may also be recognized by the distortion of the air contained in the involved portion with resulting narrowing, depending upon the degree of stenosis.

Malignant tumors of the pharynx and larynx often produce a fairly characteristic appearance. Such lesions appear as a dense infiltration of the soft parts, which, as the mass increases in size, invades the surrounding tissues and also projects as a very dense shadow into the normal air column of this region. The margins of this new growth are usually irregular in outline, but often are sharply defined and vary in size from a very small mass to a large bulky tumor which seems almost to obliterate the normally clear transparent space. Small or moderately large bulky tumors may not produce much displacement of the normal structures and spaces. With the appearance of ulceration and secondary infection, edema of the surrounding soft parts may appear with swelling of the soft parts and complex changes occur in the extensive or advanced new growths with encroachment on the usual air space; and defects due to ulceration are seen as demonstrated by the actual destruction of tissue with distortion and displacement of the normal structures and spaces, depending upon the size of the tumor mass and the direction of its extension. Infiltrating malignancies produce early distortion of the normal structures and spaces and often do not produce masses of much bulk, but this type of growth is less common than the bulky tumors, the shadow of which very often projects into the transparent spaces. The entire extent of the tumor mass may be rather clearly defined, particularly the exact extent of its lower border, which may be difficult to ascertain by other methods of examination. Some regions of the pharynx, such as the valleculae, the mucosa of the posterior portion of the cricoid, and of the esophageal opening, are difficult to examine by direct inspection. Such regions

Fig. 4-A

Advanced laryngeal tuberculosis. The ventricle is completely obliterated, and there is a tremendous swelling of the structures of the larynx and pharynx almost obliterating their usual normal air space. An irregularity in outline of the epiglottic valleculae is rather indicative of ulceration, which rules out the non-ulcerative types of inflammatory disease of this region.

Fig. 4-B

Severe non-specific infection of the larynx and pharynx. Note the tremendous swelling of the various soft structures of the larynx and pharynx, especially the aryepiglottic folds, arytenoids and epiglottis. No irregularities due to ulceration are present. Otherwise, there is nothing characteristic of the various inflammatory conditions affecting this region.

are readily visualized on the x-ray film, and a new growth of these regions may be discovered by such means when direct examination is negative. Repeated examinations during the course of x-ray therapy furnish a very satisfactory means of record, and observation of the course of the morbid process under treatment and progress in healing is readily demonstrated. Coutard[1] states that the differential diagnosis between a recurrence of the tumor and a late necrosis is better made from a roentgenographic examination than from a clinical examination.

Benign tumors of the larynx or pharynx appear as a sharply defined mass projecting into the normally clear space, and are shown in relief by the surrounding air. Their margins are clear cut and are not usually accompanied by inflammatory swelling or edema of the surrounding soft parts unless considerable secondary infection is present, which is unusual. These lesions of small to moderate size produce little or no distortion of the normal structures of the pharynx and larynx, and are not accompanied by any infiltration of the surrounding tissues; and the abnormally increased density is limited to the tumor mass itself. Occasionally these tumors may assume an unusually large size and by their own mass produce considerable distortion and displacement of the normal structures of this region and materially alter the shape of the usual air space. The lower limits or the attachment of the large benign tumors may not be accurately determined by direct inspection, but are usually readily demonstrable roentgenographically. If the benign mass arises from the structures of the larynx, the ventricle is usually distorted, being either entirely absent or of narrowed appearance; and in some instances, particularly with the presence of a large mass, the ventricle may be dilated.

Vocal cord paralysis may produce complete obliteration of the ventricle space simulating the appearance of an inflammatory process, except that it is not accompanied by swelling of the surrounding structures. In lesser degrees of paralysis the cavity may assume a sort of half-Zeppelin shape as if the cavity had been cut in half in its longitudinal direction; or the usual Zeppelin shape can be demonstrated, but one of its extremities is closed by a contraction upward of the lower portion.

Various tumors and swellings of the neck may also produce displacement or distortion of the structures of the pharynx, larynx or trachea pro-

Fig. 5

Retropharyngeal abscess. Note the marked increase in thickness of the normally thin retropharyngeal soft tissue space. The posterior border of the pharynx has assumed a concave shape; also note the narrowed and shortened ventricle. The absence of shadows of the laryngeal cartilages indicates the patient is a child.

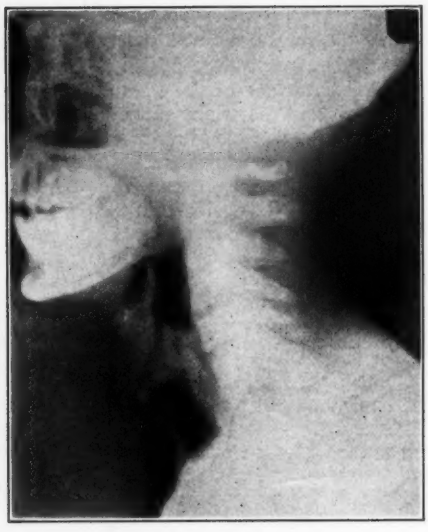

Fig. 6

Laryngeal paralysis occurring as a result of a hemangioma of the right jugular foramen. The ventricle is outlined by dotted lines and is closed posteriorly as if cut in half crosswise.

vided the mass arises close to or extends to involve these structures; and the type of deformity will necessarily depend upon the direction of the growth of such a mass. Of great importance in extrapharyngeal conditions is retropharyngeal abscess. Normally the posterior pharyngeal wall is parallel with the upper cervical vertebrae and the soft tissues separating these two structures are relatively thin and of uniform thickness throughout. When such an abscess is present, there is a marked increase in this usual soft tissue space with a forward bulging of the posterior pharyngeal wall, which assumes a concave shape, and a consequent narrowing of the air space of the pharynx.

Tumors about the trachea may also produce a fairly characteristic deformity. Normally the trachea is parallel to the lower cervical spine, and the soft tissue space is uniform throughout the lower neck, but is of much greater thickness than the postpharyngeal soft tissue space. Diverticula of the upper end of the esophagus, esophageal malignancy, or an impacted foreign body in the esophagus may displace the trachea forward and distort the usual anatomical relationships. Retrotracheal goiter can perhaps be recognized preoperatively only by the forward displacement of the trachea in the lateral view of the structures of the neck. Other types of goiter also may produce a displacement of the trachea, the direction and degree of displacement depending upon the nature of the enlargement and the direction of the extension of the tumor mass.

Roentgenological study of the soft tissues of the neck is deserving of more extended use and its possibilities should be more widely recognized as a very valuable and useful adjuvant to the other accepted methods of examination as a complementary and supplementary study. Practically all of the pathological conditions common to the larynx and pharynx show some recognizable abnormality on the x-ray film, and much useful data may be obtained by such an examination with absolutely no inconvenience to the patient and no preliminary preparation.

DISCUSSION (*Abstract*)

Dr. Roy G. Giles, Temple, Tex.—Dr. O'Bannon has given an excellent review of the normal structures to be found in the neck and has shown the roentgen findings in pathological cases. One is struck by the failure to find many references in the literature to the roentgenologic study of the soft tissue structures of the neck.

This much neglected field has been studied by various authors, although not to the extent it deserves. Manges has contributed largely to our knowledge of opaque as well as non-opaque foreign bodies. Brown and Reinke presented a preface to the study of the soft tissues of the neck without the administration of an opaque substance in 1928. Hay covered the subject in great detail in book form in 1929. Pancoast and others have contributed to the literature from time to time since 1929.

Dr. Charles H. Heacock, Memphis, Tenn.—I have roentgenograms that show cellular emphysema of the retropharyngeal tissues of a man who was held up by thugs one night about two months ago. After they had knocked him down they jumped on his neck. He had a rupture of the larynx or trachea, probably the former. We frequently see cellular emphysema of the tissues of the neck, but it is unusual to see air in the retropharyngeal tissues as this case showed. The patient made a good recovery, except that he has a hoarseness that has persisted for two months.

Dr. O'Bannon (closing).—The diagnosis of retropharyngeal abscess is often rather difficult to make by direct examination, but the x-ray picture usually offers definite findings. Bulky tumors may be very strikingly portrayed. The extent of severe infection is often difficult to determine by direct examination, but by roentgenograms a permanent record of the progress of various conditions can be obtained with no discomfort to the patient. The additional information available by x-ray study of this region should be welcomed by the profession and utilized more often.

THE TREATMENT OF LYMPHOID HYPERTROPHIES AND INFECTIONS OF THE PHARYNX AND NASOPHARYNX BY IRRADIATION*

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The title of this paper will probably bring back to the memory of some of this group the introduction and utilization of irradiation therapy of the tonsils. This method, the purpose of which was to destroy tonsillar tissue, became rather popular, roughly, fifteen years ago. It would be only proper to review hastily that period of great activity.

It is very interesting in reviewing literature on this subject to find absolutely no reference to the therapeutic irradiation of tonsils, or pharyngeal lymphoid tissue in general, previous to 1920. Heinicke, in 1904, and Regaud and Nogier, in 1931, however, had irradiated lymphoid tissue in their study of the reaction of various tissues of the body to irradiation, but this work passed unnoticed, seemingly because no clinical application was recognized. One finds all reports subsequent to 1920 discussing mainly the irradiation of the tonsils, with only a few references to the adenoids. Still fewer references are found where the treatment was primarily directed toward the destruction of lymphoid tissue on the pharyngeal and nasopharyngeal walls, such as is often found after the tonsils and adenoids have been cleanly removed.

Witherbee[1], in early 1921, reported his first case that had been subjected to this method of treatment; one that he had treated two years previously, in 1919. He and his coworkers[2] soon thereafter reported a series of 46 cases treated. They discovered, among other things, a marked shrinkage in the size of the tonsils, and a marked reduction in the bacterial count in cultures taken from the tonsillar crypts. The reduction was found to be most effective among the hemolytic streptococci. This lowered bacterial count was attributed to the improved drainage of the crypts by the decrease in size of the lymphoid structures. All but four of their patients were said to have had good results. These workers were the first to state specifically that roentgen rays had been used by them on lymphoid hypertrophies of the pharynx after tonsillectomies.

Waters and his coworkers,[3] in 1922, did not observe that the bacterial count was reduced in the tonsillar crypts following irradiation, and remarked that the irradiation, in their opinion, was rather limited in its applications. Their most satisfactory results were found in the simple tonsillar hypertrophies, where there was a tremendous excess of lymphoid tissue. This conclusion was substantiated by the same authors in the following year. In other words, children rather than adults, with hypertrophy of the tonsils in which there was minimal infection, were thought to be most benefited. MacCready[4], in 1925, summarized the results obtained by Waters and his coworkers over a three-year period of time. Fourteen cases had been followed during that time. The outstanding features were the reductions in the frequency of head colds and other upper respiratory infections. He concluded that surgical treatment was indicated where there was obvious infection of the tonsils in contrast to the simple hypertrophies.

Shortly thereafter numerous contributions to the medical journals on this subject were found, indicating a great period of activity. The foreign roentgenologists and otolaryngologists were not yet so active as the American profession at this stage. There was an increased tendency during this period to accept roentgen rays as an easy method of destroying tonsillar tissue.

In cadence with this trend, one finds many enthusiastic workers, late in 1922, reporting satisfactory results. Trinder[5] reported 65 cases. He was certain that bacterial counts had been reduced by this method of therapy. To prove the shrinkage in size of the tonsils, he removed one tonsil surgically and irradiated the other tonsil. Six months later the irradiated tonsil was removed, and the histopathologic structures of the two tonsils compared. He noted improvement in many clinical symptoms of his patients, such as tinnitus and impaired hearing, after irradiation of pharyngeal lymphoid tissue remaining after tonsillectomy.

Radium and radium emanations soon began to replace roentgen rays because of the greater ease of application, and many articles again ap-

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peared in the journals. Wells,[6] in one of the earliest papers on radium therapy on tonsils, was doubtful about the reduction of the bacterial count following irradiation, but noted the atrophy of the tonsillar structures.

Babcock[7], in 1925, summarized the significant reports of the preceding four years. It was evident that observers in various localities did not personally obtain, from irradiation, results comparable to those generally reported and expected. Babcock reviewed the 49 most important articles published in the four-year period ending in 1925, and found 28 authors (57 per cent) who reported good results; 11 authors (22 per cent) who reported questionable results, and 10 authors (20 per cent) reporting irradiation therapy on tonsils without value. He then added 10 cases of his own that had demonstrated satisfactory results.

No further significant articles appeared until 1927, suggesting a wane of the enthusiasm over irradiation therapy. There was a tendency to grope for still newer and more refined methods of treatment. Then Denman[8], in 1927, combined ultraviolet rays with roentgen rays in a series of 500 cases and concluded that this combination of therapy was more satisfactory in the destruction of bacteria in the tonsillar crypts.

Williams[9] published two articles in 1928 stressing the importance of the eradication of all pharyngeal lymphoid tissue in the treatment of rheumatic fever and rheumatic heart disease, and pointed out the usefulness of irradiation therapy in its destruction.

Knox,[10] in 1930, again suggested the roentgen ray method of irradiation of the pharyngeal lymphoid tissue, and he was inclined to apply such treatment also to tonsillar remnants. Most of his discussion was directed toward the treatment of these conditions in children. He was one of the earliest of writers to prescribe a series of small doses of roentgen rays.

The decline in irradiation of tonsils is shown still further when Scal[11], in one of his latter articles of 1930, suggested the use of radon seeds only on the "non-operable" tonsils. He used two seeds in each tonsil, the seeds carrying 1.5 mc. each. There was a tendency back to the surgical removal of tonsils because numerous patients eventually found it necessary to have irradiated tonsils surgically removed.

In 1932 the wave of enthusiasm had reached Europe. Germany and other foreign countries began to report favorable results of irradiation therapy of the tonsils, but within a short period of time conflicting reports appeared, just as they had previously done in this country. The studies of foreign workers were several years behind those of the American workers, and as a result their literature contained articles relative to the subject considerably later than was found in American literature. Birke[12], Tschiassny[13] and Hundeman[14] wrote the most interesting and conflicting articles of that period. The finale of irradiation therapy of tonsils in America appeared shortly after 1932. Hoover[15], in 1934, wrote that he was more satisfied with the use of a snare and the surgical dissection of large growths of lymphoid tissue in the pharynx than by the use of chemicals, cautery, electrical diathermy, roentgen rays, or even radium.

Thus ends the history of the sudden rise and rather rapid wane of irradiation therapy for the destruction of the tonsils and adenoids. However, the unsatisfactory results obtained in the irradiation treatment of tonsils and adenoids did not hold true for lymphoid tissue scattered over the pharyngeal walls. Thus it is the purpose of this paper to discuss further such treatment and attempt to demonstrate its practicability.

In the previous discussions of irradiation of lymphoid tissue, attention has been directed to the encapsulated lymphoid tissue, such as found in tonsils. In this article we wish to refer to the non-encapsulated lymphoid tissue which is found scattered over the pharynx and nasopharynx, and especially we refer to that tissue which cannot be surgically removed with any degree of satisfaction.

We directed our treatment to the reddened, granular-appearing posterior wall of the pharynx; to the posterior wall that is covered with isolated patches of lymphoid tissue which are very obvious, or to the reddened lymphoid tissue along the lateral walls of the pharynx just behind the soft palate. These lymphoid follicles vary in size from a pinhead up to the size of a ten-cent piece.

In our specialty, we find patients whose chief complaint is the persistent or recurrent infection of the lymphoid tissue mentioned above. These patients are greatly annoyed because of the inconvenience and discomfort caused them, and in turn they can become annoying to their specialist by the frequency of their return visits, when no alleviation of the trouble ensues. In such cases the pharynx has been swabbed and painted with every type of chemical antiseptic known; gargles of all types have been used, but the chain of events continues in its cycle.

There are systemic disorders which may be traced to the toxins liberated from the infection of this lymphoid tissue, such as neuritis, iritis, nephritis, arthritis, and asthma or asthmatic bronchitis, and many other diseases. Local manifestations may be found which would include enlarged and tender cervical lymph nodes and the sensation of dryness in the pharynx. Pharyngeal fatigue, burning or actual pain may be complaints. Usually there is excess mucoid discharge in the pharynx which may cause frequent clearing of the throat, cough, bronchitis, and even gastric irritation. Otitis media, sinus infections, furunculosis and numerous other conditions may be traced to the infection of the pharyngeal lymphoid tissue.

The streptococcus organisms are those most frequently found thriving in the lymphoid tissue of the pharynx, but occasionally one finds diphtheroids, mycelia and other types of flora. If crypts or depressions can be found in the lymphoid tissue, the anaerobic fusospirochetal infections may harbor there, probably originating from some gingival or dental infection. If a fusospirochetal infection is found and is demonstrated, the angina may be controlled by the usual treatment for the fusospirochetal infection, but this does not prevent recurrences. One cannot be certain but that the filterable viruses of poliomyelitis and other lesser understood diseases originate and harbor in infected pharyngeal lymphoid tissue. Various metabolic disorders, notably diabetes and thyrotoxicosis, are very difficult to control concomitant with pharyngeal infections. Altogether it then becomes very obvious that the lymphoid tissue in the pharynx should by all means be thoroughly eradicated.

The only published article dealing exclusively with this present subject appeared in 1932 in a Cuban journal. Soto[16], in that article, found undeniable improvement in 18 cases treated for lymphoid hyperplasia and infection of the pharynx. His patients' symptoms were similar to those of our experience, which have just been partially enumerated. He found the irradiation treatment especially effective in the control of the frequency and severity of recurrent upper respiratory infections. The lower respiratory infections were found to diminish in frequency and severity according to the results obtained in the upper respiratory tract. The only type of patient not improved was the allergic patient, who received benefit only when the allergens were bacterial in origin. Only 18 patients were reported by Soto, and his observations must have covered a long period of time, as his treatments were given in a rather small and prolonged dosage. He felt that treatment could not be repeated oftener than two months apart, and in no case were more than four treatments given, which deviates considerably from the therapy now employed.

Over a five-year period of time we have recommended irradiation therapy of the pharyngeal lymphoid tissue to approximately 225 individuals. Of this number, we have completed treatment in 143 cases, and we referred the remainder to radiologists, who were properly equipped for this treatment, in other cities. We have no record as yet on this latter group, but we do have partial results on those patients treated by us.

In all patients, except one, in the total series that we have followed, the tonsils and adenoids had been previously removed. In only a very few patients were there remnants of tonsillar tissue sufficiently large for surgical removal, but, when possible, this tissue was removed by dissection before the remaining pharyngeal lymphoid tissue was irradiated.

Symptomatically, almost all of the patients complained of frequent or almost constant sore throats. Others had frequent head colds, annoying post-nasal or pharyngeal discharge, enlarged or tender cervical lymph nodes, tinnitus, impaired hearing, hoarseness, arthralgic or neuritic pains, and allergic manifestations. Four patients that we treated had chronic nephritis, two had rheumatic fever, five had asthmatic bronchitis and two had urticaria. Several patients complained of difficulty in swallowing, choking sensations and gastric disturbances, with a subsequent endless chain of fanciful and neurotic symptoms. The neurotic group was rather difficult to treat, and, as a matter of fact, they were reticent in acknowledging any benefits derived by irradiation.

About seven weeks ago questionnaires were mailed to all of our 143 completely treated cases. We specifically asked the patients their unbiased opinion of the results obtained by the irradiation of the lymphoid tissue of the pharynx, together with any comments they wished to make. To date 67 replies have been received. Of these, 47 (70 per cent) state that good results were obtained, 16 (24 per cent) state that results were questionable, and 4 (6 per cent) state that poor results were obtained.

Without apology, we feel it only fair to make a few remarks regarding several of the 16 patients

who reported questionable results. One patient acknowledged that he no longer had sore throats, but that his general health was the same; when he was primarily treated for sore throats. Another patient had gained considerable weight, no longer had anorexia, urticaria, or sore throats, but reported questionable results. Of the four patients stating that poor results were obtained, we offer no explanation for two, but desire to mention that the other two were rather hopeless neurotics, with an endless number of complaints before treatment was instituted. One of them had marked associated menopausal symptoms. As stated above, we offer no excuse for the poor results obtained in these cases since we accepted them for treatment. It is our candid opinion, however, that improvement had been obtained locally in the pharynx, if visible lymphoid tissue is the criterion of judging.

Among those deriving marked benefit was a well-known vocal soloist and musical director. He was quite pleased and wrote us that his throat was in a better condition than it had been for a long time. Another patient called the treatment a "perfect success" since she had not had a sore throat in the intervening four years.

The ages of our patients varied from 4 years to 58 years of age. Neither of these ages are regarded as age limits, since the irradiation therapy, in careful dosage, is innocuous at any age. Sixty-six patients were females and seventy-seven were males. The treatments varied from one to eight doses, these doses being given no more frequently than weekly intervals. In some cases, due to economic status or geographical distance, only one treatment could be given. Several patients required only two or three treatments to complete their therapy. Others required up to six doses, which, incidentally, is considered the average number. There were a few patients who required eight treatments, there being much more pharyngeal lymphoid tissue to destroy than in the average patient.

The technic of irradiation in these cases has been standardized during the last few years. The dosage was carried out under the following conditions: 130 kilovolts, 5 ma., 25 cm. distance and 3 mm. aluminum filter. The erythema dose using these factors is 375 roentgen units. The dosage first used was 100 r. administered over each side of the neck at weekly intervals, giving four to six treatments in a series. This dosage in some patients produced considerable dryness of the nasopharynx; therefore, the treatments, where possible, were given at two-week intervals, using 150 r. as the dosage over each side of the neck. The immediate reaction depended on the degree of infection of the lymphoid tissue. This reaction was characterized by a congestion and swelling, and often, four to six hours after the treatment, the salivary glands and cervical lymph nodes became enlarged. This reaction of lymphoid tissue to roentgen irradiation has been fully discussed by Akaiwa[17] in his recent article and also by Soto in 1932.

We do not always expect to find an obvious total destruction of large lymphoid follicles, but the diameter does decrease in size, leaving only the stroma, following the total dosage that we administer. The small follicles and the granular looking pharynx, however, do lose their original appearance.

In summary, we have reviewed the beginning, in 1920, of the utilization of radiological therapy on the encapsulated lymphoid tissue of tonsils, which originally employed roentgen rays, but was shortly replaced by radium or radium emanations. By 1930 the irradiation therapy of the tonsils had been discontinued and surgery had regained its place in the removal of tonsillar tissue. We have attempted to show by the results obtained in 18 patients of Soto[16], and in 143 cases of our own, that the chronic hypertrophy and infection of the non-encapsulated lymphoid tissue of the pharynx and nasopharynx can be successfully treated by roentgen ray irradiation. We suggest such treatment in all patients with chronic symptoms referable to hypertrophied and infected pharyngeal lymphoid tissue, especially when other modes of treatment have failed to alleviate those symptoms.

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DISCUSSION (*Abstract*)

Dr. Robert J. Reeves, Durham, N. C.—The irradiation of lymphoid tissue is by no means new. Warthin, Professor of Pathology in Michigan, in 1905, in International Clinics, gave a detailed report on re-

search work done and on cases treated. It is unfortunate that the otolaryngologist did not follow his teaching. The irradiation of tonsils in certain selected cases, by a radiologist, produced fairly good results, but the work finally fell in the hands of the charlatans, and this partly accounts for its rapid decline.

The irradiation of lymphoid tissue has been done for a number of years, but as yet there is very little about it in the literature and, unfortunately, the general otolaryngologist knows very little about it. Not knowing its value, he often condemns it to the patient who is undergoing such treatment. Those inclined to doubt the efficiency of radiotherapy must admit that there is a definite action on the infected lymphoid tissue. These benefits we have found over a five-year period to be permanent.

The dangers to be encountered were also listed by Warthin in 1905. He found in cases of cancer of the cervical lymph nodes that the lymphoid tissue was replaced chiefly by fibrous tissue. This is also true in the follicles of the posterior pharynx. We use as a criterion the appearance of these follicles and also the patient's condition, dryness of the mouth, and so on. We believe that about six treatments at two-week intervals are needed.

McKenzie, in March, 1935, reported a series of 32 cases of acute septic sore throat which were treated by irradiation with good results. His theory is that accepted by all, that is, that the x-ray destroying a certain number of lymphoid cells liberates a neutralizing agent to cope with the infection.

Woodard, of the University of Virginia, in a personal communication said that he has a series of patients treated in whom results were satisfactory.

Dr. John T. Crebbin, Shreveport, La.—Fortunately, the destruction of tonsillar tissue by irradiation is a thing of the past. The rise of this method was rapid and during this period it had a rather stormy time. Naturally, its life was of short duration.

The decline was due to the fact that irradiation and the use of radium seldom, if ever, relieved, much less cured the patient, for frequently a tonsillectomy had to be resorted to later.

Doubtless irradiation is now being applied in its proper sphere. Possibly, more careful examination and an improvement in our technic explain the encouraging results now obtained.

Irradiation is indicated in patients following a successful tonsillectomy when the patient still complains of a sore throat, clearing of the throat, hoarseness, and so on. There may or may not be some nasal discharge. There may be no tonsillar fossa complications or scar tissue. Further examination demonstrates the pharynx as a possible cause of continued trouble. There is some hypertrophy and redness of the pharyngeal follicles. This condition may even extend to the lingual region. A microscopic examination of the pharyngeal discharge usually reveals a mixed infection. With a condition of this kind it is common to find the cervical lymph nodes enlarged and tender.

Edwards, in the *New Orleans Medical and Surgical Journal* of April, 1924, reports a large number of cases successfully treated after a tonsillectomy.

There is not the slightest doubt that in selected cases as mentioned by Dr. Eagle irradiation is of incalculable help.

PROSTATIC MALIGNANCY AS REVEALED BY THE RESECTOSCOPE*

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In the early part of 1932 we began the use of the modern resectoscope for the removal of prostatic obstructions. In the beginning we did not practice routine microscopic examination of the tissue removed, but did begin this in 1934. Since that time we have had 133 consecutive cases of resection on which we have microscopical reports. It occurred to us that it might be of interest to compare the clinical and pathological reports in these cases.

Before going to this part of the report it seems a review of the gross anatomy of the prostate should be given. In Keyes' "Urology" we find the following description:

"The prostate is a sexual organ partly glandular, partly muscular, lying in front of the bladder and surrounding the prostatic urethra. It is cone-shaped with the apex against the posterior layer of the triangular ligament, its base toward the bladder and traversed anteroposteriorly by the urethra. The ejaculatory ducts pass through it from below upward to enter the prostatic urethra. Its diameters are: apex to base 3 to 4 cm.; transverse, 4 to 5 cm.; anteroposteriorly, 2 cm., according to Randall. Its weight is 16 to 24 grams. It is beneath the symphysis and above the rectum, from which it is separated by Denonvillier's fascia."

Grossly the gland is divided into two parts by the ejaculatory ducts. That portion behind the ducts is called the posterior lobe and is the usual site at which carcinoma begins. This fact, and the knowledge that the middle and lateral lobes are the ones resected, led us to believe that the sections recovered by the resectoscope, especially in early cases, might not show carcinoma.

Most authors agree that carcinoma begins in the posterior lobe, but Albarran reports that small lesions are found in the lateral lobes in 10 per cent of cases. In such cases transurethral removal would probably show carcinoma. In prostatectomy this seemed of less importance, as the growth was occasionally removed *in toto* by enucleation. In the present method, however, there must be a definite possibility that part of the growth will not be removed and carcinomatous development will continue.

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Carcinoma within the prostate is of moderately slow growth and causes considerable fibrosis, which accounts for the "stony hardness" felt per rectum. Clinically we recognize this as almost diagnostic, but we must remember that in a small number of cases softening may occur. If it is true that carcinoma begins in the posterior lobe, which is generally conceded, and that this is the presenting part felt on digital examination, then routine rectal examination of the prostate in men past fifty years of age should enable us at least to suspect, and in a fair per cent to diagnose carcinoma early enough to give the patient the benefit of such curative means as we have. This is far from ideal at present. The growth is usually upward along the ejaculatory ducts beneath the trigone and between the bladder and vesicles. The lymph nodes of the pelvis and lumbar region are involved early, while the rectum, bladder and urethra are generally involved later, if at all. The most frequent bony transplants are in the sacrum and lumbar vertebrae.

Symptoms.—About 50 per cent of cases occur between the ages of 60 and 70 years, 25 per cent over 70 years, and 25 per cent under 60 years. If it is confined to the prostate the symptoms may be slight, or only a vague perineal pain. Bone or glandular involvement may occur before the prostate serves notice of trouble. Sciatica and pelvic pains are frequent. Pain in some situations occurs in about 35 per cent of cases. Hematuria occurs, but is much less frequent than in simple prostatism. Retention is common, but is usually a decade later than in hypertrophy. Cachexia is also a late symptom.

The prognosis at present is bad. Barringer says: "We realize for the most part it is a fatal disease."

Diagnosis.—Given an old man with urinary disturbance, a bone tumor and sciatica or pelvic pain, carcinoma of the prostate should be suspected. Hematuria is not diagnostic. Someone has said that a diagnostic group of symptoms is bilateral sciatica in an old man with difficult and frequent urination. Rectal examination is extremely important, and any area of distinct hardness in a man over 50 years of age should be regarded with suspicion. Tuberculosis, stone or scars from an inflammatory prostatitis must be differentiated. Tuberculosis usually occurs in younger men. Stone may be diagnosed by the x-ray, or palpation with a sound in the urethra may eliminate it. The location also should help to rule out a calculus, stones being found in the lateral lobes. The roentgenogram may also show bone lesions in carcinoma. There is usually a fixed feel to the prostate and vesicles. Cystoscopy may be negative, but there may be difficulty in passing the scope, the bladder neck may be tight and the scope lie after passage with the ocular end depressed. The trigone is elevated, and in later cases may be nodular.

Carcinoma of the node above the left clavicle is an early sign. Young (before the resectoscope became the vogue) reported 20 per cent of all cases with symptoms of hypertrophy as carcinoma. In the recent literature we have been able to find only two reports on percentage of carcinoma in resection. Alcock in the *Journal of the American Medical Association* of October 1933, reports 19 per cent in 400 cases, while Kretschmer in the SOUTHERN MEDICAL JOURNAL of March, 1935, reports 11.3 per cent in 551 cases.

In this article we are reporting 133 consecutive cases of resection on which we have clinical and pathological reports. These include: white 115 cases, colored 18 cases. The average age was 65.6 years. The youngest age was 47 years. The oldest was 83 years. In this report there are 11 cases of carcinoma, all but two of which were diagnosed as such previous to operation. There are three cases given in the pathological report as suspicious; of these one was not suspected clinically. There are two cases diagnosed clinically as suspicious, which were reported as glandular hyperplasia microscopically. There is one case which clinically and pathologically at the first resection was diagnosed as benign, but at the second resection was reported microscopically as carcinoma. Including the suspicious cases we have a percentage of 9.5 in this series. This is a very small percentage compared to other observers, and we can account for it either by the small number of cases or by the possibility that the resectoscope did not reach the malignant areas.

SUMMARY

(1) In this series of 133 cases there are nine cases of carcinoma in which the clinical and microscopical diagnosis agreed, or 100 per cent agreement.

(2) There are four cases diagnosed clinically

as suspicious. Of these, two were diagnosed pathologically as suspicious and two as glandular hyperplasia, a 50 per cent disagreement.

(3) One case was diagnosed pathologically as suspicious, which was not suspected clinically of being malignant.

(4) One case diagnosed clinically and microscopically as glandular hyperplasia after one resection, was microscopically carcinoma following a second resection.

(5) There are, including the microscopically suspicious cases, 14 malignancies, a percentage of 9.5.

CONCLUSIONS

(1) It is evident from this series that in all clinically frank cases of carcinoma of the prostate the resected tissue will show malignancy.

(2) The most illuminating observation was that in clinically suspicious cases only 50 per cent showed malignancy microscopically; and that one case, not suspected either clinically or microscopically following the first resection, proved to be carcinoma after a second resection. To our mind this indicates that in early cases the resectoscope does not remove sufficient tissue to demonstrate malignancy.

(3) If this be true, then it is of utmost importance that following resection all suspicious cases be observed at regular intervals for a considerable period of time, at least three years.

DISCUSSION (*Abstract*)

Dr. Edgar G. Ballenger, Atlanta, Ga.—The essayists have discussed a most important subject and also one which is difficult to manage in a satisfactory manner. Two recent developments have assisted in the management of carcinoma of the prostate, namely: the removal of obstructing tissue by the transurethral method and the employment of the modified Coutard treatment with deep x-ray therapy. For some time we have employed short, heavily screened, deep x-ray treatments. These are administered every day except Sundays for four to six weeks. Properly given, the rays are sufficiently screened and the exposures sufficiently short to prevent disturbing reactions. We think it desirable to administer the x-ray treatment before the transurethral resections, which are then made easier because of the fibrotic change brought about by the x-ray. Moreover, the likelihood of metastatic spreading of malignant cells is lessened.

Our experience so far leads us to believe this is the best plan we have yet employed in the management of prostatic carcinoma.

Dr. T. M. Davis, Greenville, S. C.—Many urologists have questioned the advisability of resection in hypertrophy of the prostate because of the possibility that a malignant focus may be left following resection that would have been removed if prostatectomy had been performed.

The incidence of malignancy has been 10 per cent in my series of 876 cases of resection. However, if the bars and contracture cases are eliminated from the series, the malignancy incidence will be about 15 per cent of the total.

Among over four hundred cases in which resection was performed earlier than five years ago, only one developed carcinoma which was not found on tissue examination at the time of operation. It would appear from this that the danger of not detecting malignancy in glands subjected to resection is not so grave as many would have one believe.

When an adequate resection is performed, the lateral lobes should be removed down to the supposed prostatic capsule and the median lobe should be thoroughly removed. When adequate resection is performed in this way, the danger of leaving malignant cell nests is not more likely than during prostatectomy.

Dr. R. E. Van Duzen, Dallas, Tex.—I do not believe we can ever hope to remove malignancy of the prostate by resection. We have not improved in this regard at all in spite of the many claims. I am not enthusiastic about the results of x-ray or deep therapy including the Coutard method. I feel the only advance will be made when we are able to diagnose these cases earlier. I have noted in three cases that there was bleeding from the prostatic ducts about the vera. These cases are proven cases of malignancy. When the bleeding is about the internal sphincter I have found it to be due to inflammatory causes. It is possible we may be able to diagnose an early malignancy if we see blood coming from the prostatic duct.

Dr. H. K. Turley, Memphis, Tenn.—There is no question that hypertrophy and small areas of malignancy occur in the same gland. One is even surprised at times to get a benign report from the pathologist concerning a case in which the clinical signs were those of malignancy. So many small pieces are obtained by the resectoscope that it is impossible to include all in the sections to be examined. Those selected may unfortunately not be from a malignant portion. I think it would be best to save sections removed in suspected cases and other blocks made if the pathological findings do not coincide with the clinical. All pieces removed could be labeled and kept indefinitely so that future reference may be made to them.

Dr. McQuiddy (closing).—Dr. Ballenger uses deep x-ray therapy in fractional or minimum doses. It is our custom to use massive dosage. In the opinion of most roentgenologists this seems to be the method of choice, and it certainly has given us better results. Dr. Davis states that we do not remove enough tissue. In reply we can say we have been removing enough of the gland to give the patient a good free stream and an empty bladder. However, we must acknowledge that of late we have been removing much more tissue than was formerly our custom. In reply to the question, "When is cancer cured?" our answer is that one man's guess is as good as another's. Because of this uncertainty, we advise all carcinoma patients to return for careful observation over a long period of time.

THE EFFECT OF MORPHINE UPON THE HUMAN URETER*

CLINICAL APPLICATION

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and
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That morphine is the most valuable drug in all the pharmacopeia is an incontrovertible fact. That its action is still little understood is also true. It is still popularly believed among medical men that morphine quiets and relaxes the ureter, but that this idea might not be exactly correct has long been suspected by some of us. We have frequently observed, when called out in the night to treat a patient in the throws of a ureteral colic, that in a period of from two to five minutes after the administration of a quarter of a grain of morphine, subcutaneously, the patient seemed to be attacked by a renewed paroxysm of pain, and frequently cried out to the effect that his pain was distinctly worse, but in fifteen minutes the pain had disappeared and the patient was peaceful.

It seemed to us that it would be of considerable interest and no small value to attempt to study accurately the effects of morphine upon the intact human ureter. In 1924, Harry Trattner[1] published a method for recording the contractions of the intact human ureter and thus removed some of the difficulties in the way of such investigation. His studies seemed rather conclusively to prove that it was possible to study the contractions of the human ureter by means of ureteral catheters connected to tambours, so that tracings could be recorded upon a kymograph. We constructed an apparatus patterned after Trattner's hydrophorograph and started out to review Trattner's method, which we found to be an essentially sound procedure for studying the pharmacology of the ureter.

Only two other studies on the action of morphine on the ureters have been published, one by Macht[2] and the other by Gruber.[3] Gruber studied the action of morphine on excised pig ureters which were suspended in Tyrode's solution and recorded both circular and longitudinal movements. He stated that dilute solutions of morphine when applied to the pacemaker gave an increase in tone and peristalsis, while more concentrated solutions gave increased tone but more increase of the pendular movements. The various workers who have published their observations upon the movements of the kidney pelvis and ureter, using the fluoroscope, have added some very important ideas to the physiology of the human kidney and ureter. Macht used human ureters which were excised at operation for his study of the effects of morphine. He also used segments of animal ureters which were suspended in a bath of Locke's solution, and he reported that the addition of morphine to the bath gave an increase in tone and an increase in the size of the contractions. Legueu,[4] in 1927, was among the first to use the fluoroscope for the study of the physiological action of the kidney pelvis. Herbst,[5] in 1931, presented a series of fluoroscopic studies in which he observed many degrees of mobility in the human kidney pelvis, and made the interesting observation that the normal human pelvis emptied itself in from two to ten minutes. Jona and Flecker,[6] Australian workers, published some very interesting observations in 1930 wherein they used the fluoroscope to observe the effect of certain drugs upon the human ureter and upon the kidney pelvis. They stated that they were able to view upon the fluoroscopic screen the effects of such drugs as atropine, morphine, strychnine, eserine, pituitrin, histamin and ergot. Their statement that atropine always "causes a relaxation of the kidney pelvis with overfilling and pain in the human subject" seems to us to be open to some doubt because we were unable to obtain tracings which showed a loss of tone or decrease of contraction waves in the upper ureter and kidney pelvis when atropine alone was given subcutaneously. In preparation for this work we reviewed all the literature that relates to the innervation of the ureter and we discovered that the anatomy of the ureter is still a somewhat debatable subject. The blood supply to the ureter is fairly well worked out, but it has a wide range of anatomical variation. Even the knowledge of muscular structure of the ureter is not entirely clear. A great deal of work has been done in the attempt to establish the true facts concerning the innervation of the ureter. A majority of anatomists agree that the ureter gets its nerves from the hypogastric sympathetic system and from the sacral parasympathetic system and that both of these reach the ureter near where it enters the bladder. Some say that the ureter receives no nerve fibers

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*From the Department of Urology, University of Kansas School of Medicine.

along its abdominal or pelvic course other than those mentioned above. Some surgical enthusiasts would have you believe that by exposing the ureter and stripping it free from all its surrounding structures, the ureter can be denervated. Papin, in Paris, ridicules this idea and says that a denervation cannot be done in that fashion. The idea that the fibers from the hypogastric sympathetic system and from the sacral parasympathetic system both reach the ureter near where it enters the bladder, is somewhat supported by our observations on the effect of morphine upon the ureter. We confirmed Trattner's observation that the best contraction waves could be obtained in the lower one-third of the ureter.

Our work was undertaken largely with a view of trying to decide whether the pharmacologists or the practitioners were correct. Thus far, we have studied the contractions of the human ureter in fifty patients with presumably normal ureters. Most of these patients were women, for obvious reasons. No precystoscopic medication of any kind was given in order that there might be no interference from any other drug. The apparatus used for recording the contractions was a modification of that devised and described by Trattner in his studies on the physiology of the human ureter. The patient is cystoscoped and the ureteral catheter, usually a number 6 or number 7 whistle tip, is passed into the ureter to the desired position. The free end of the catheter is connected to a water tambour and the contractions are recorded on the kymograph. We recognize, of course, that objection might be made to the fact that a ureteral catheter, thus placed within the lumen of the ureter, would act as a foreign body. We tried to study what might be the foreign body effect of the cystoscope or of the ureteral catheter as it lay in the ureter. Trattner has gone over this pretty thoroughly and he concluded that the foreign body effect of the ureteral catheter was rather negligible. If a patient lies quietly on the table, does not cough or does not make any restless movements, the normal tracings proceed at a beautifully regular rate and each ureter seems to have a characteristic tracing of its own, varying with the patient and in the same patient at different times. In addition to number 6 and number 7 catheters, we sometimes used number 8 bulbs, according to the size of the ureteral orifice and the caliber of the intermural portion of the ureter. It seemed to make no difference as to the exact size of the catheter used, provided it fit snugly within the ureter. We selected a hypodermic needle which would be of slightly less caliber than the lumen of the ureteral catheter to use on the tubing after the urine had passed the tambour. Thus, we created a slight positive pressure in the ureter without causing distention and in this manner obtained tracings from the lower one-third of the ureter, middle one-third of the ureter, upper one-third of the ureter and the kidney pelvis. The best and most uniform tracings were obtained when the catheter was in the lower one-third of the ureter.

Our procedure then was as follows: after the catheters had been passed to the ureters and connected to the water tambour and a satisfactory normal tracing had been obtained on the kymograph, a dose of one-sixth grain of morphine was given subcutaneously by hypodermic and the tracings were continued. We found that doses of one-fourth grain of morphine gave a more marked effect, and a still more striking effect was obtained by one-third grain of morphine and one-half grain of morphine gave a still greater increase in tone and amplitude of the contractions. Another observation was that if a patient was given a dose of one-sixth of a grain of morphine and the increase of stimulation was noted and another one-sixth grain given, there was still a further increase in the amplitude of the contractions and the tone of the ureter was observed. This was true of any size dose of morphine given. The effect was always within from two to five minutes of the time of injection. In other words, it was found that the larger the clinical dose the greater the effect upon the stimulation of the ureters. In general the more active the ureter at the beginning of the experiment the greater was its response to morphine. The rate of contractions remained the same, but the tone and amplitude were increased in all cases. The best contractions were recorded from the lower ureteral segments, but the contractions from the upper ureter and kidney pelvis were always smaller and more irregular than those from the lower segment. The response to morphine stimulation was constant, but not so striking as in the lower segment of the ureter. We used atropine to emphasize the morphine effects. If morphine is given first and the response of the ureter recorded, then atropine in doses of one one-hundredth grain given, an interval of from eight to twelve minutes ensues before the morphine stimulation is wiped out. This atropine effect is in this situation very striking for the contraction waves are not completely inhibited, but are shown on the tracing as tiny waves with

the base line greatly lowered, thus indicating the loss of tone. If atropine is given alone without morphine, the effect is not nearly so dramatic, the normal contraction waves being slightly reduced with a slight loss of tone. The atropine effect is not by any means as uniform and constant as the morphine effect. When morphine and atropine are given together the morphine effect comes through first, manifested by increased tone and increased amplitude of the ureteral contractions in from two to five minutes; then the atropine, which is slower, overtakes the morphine and wipes out its effect, so to speak. How long the morphine effect upon the ureter will last we do not know exactly, but we kept the kymograph running three hours on one patient without observing any diminution in the stimulating effect. Orr and Carlson[7] observed on the intestinal tract that morphine stimulation continued for as long as eighteen hours. We observed the effect of morphine upon the kidney pelvis and ureters under the fluoroscope and used a combination of intravenous skiodan and retrograde injection of opaque media which showed a marked activity of the kidney pelvis and ureter in its response to morphine. From our studies we can say definitely that the effect of morphine in increasing both the tone and contractions of the ureter is so striking in its regularity that the time of its occurrence can be regularly predicted.

These studies are largely based upon the effect of morphine upon presumably normal ureters. In a few instances we studied patients with known disease of the ureters and we discovered the normal activity of these ureters is not nearly so great as that of the normal ureter and also that their response to morphine was not so definite.

The clinician will at once point out that where morphine is indicated there is generally some abnormality of the ureter. Probably the most common condition which calls for relief of pain by morphine is the ureteral colic due to the passage of a ureteral stone. In these cases, if the stone is suddenly dropped out of the calix and down into the ureteral tube, the ureter may be fairly normal, being only slightly congested, and its response to the drug may be quite as good as a ureter which did not contain a stone.

Now to go back to our original observation, which was that morphine given in cases of ureteral colic for stone increased the patient's pain and distress for the first few minutes. In the light of our clinical experimentations, herewith set forth, we can in a measure explain what has happened. It can be readily seen that after morphine is given the increased peristalsis upon a foreign body, like a stone with many sharp spicules, means that the ureter simply contracts down painfully upon this foreign body and that therefore the colic is increased. Some fifteen or twenty minutes later the cerebral or sedation effect of the drug steps in and the patient is relieved of his pain, an explanation that was made by Macht[8] twenty years ago. We have also observed cases where it seemed as if the stone was passed shortly after giving a hypodermic of one-quarter grain of morphine. This always was a puzzle in view of the generally accepted notion that morphine stopped the peristalsis and quieted the ureter. Another clinical application of this study of the effect of morphine upon the kidney pelvis and ureter is in case of an acutely obstructed ureter. Suppose we have a hydronephrosis which has become very painful and because of which the patient calls a physician for aid. Such acute obstruction may occur from a number of different causes, but whatever the cause we will presume there exists a hydronephrosis and, since it is of fairly recent origin, it stretches the capsule of the kidney and also the kidney pelvis, thereby producing pain by mere hydrostatic pressure. If such a patient be given a quarter of a grain of morphine subcutaneously the increased tone and the increased power and amplitude of the contraction waves may force some of the dammed up urine through the obstruction and thus bring about a certain amount of relief of pain on that basis. Otherwise the pain may be increased and there ensues a delay of some fifteen to eighteen minutes before the pain sensation is inhibited. Ureters which are markedly thickened and pathological not only do not have normal contraction waves, but do not respond normally to pain sensation, and morphine does not effect a preliminary stimulation to contraction. We would not have you believe from this work that morphine should not be given in cases of ureteral colic, for it is invaluable. At the same time, the mode of action of morphine on the intestinal tract and upon the ureter might well be quite different; the action upon the intestinal tract being largely a churning process, while the function of the ureter is the conveyance of urine from the kidney to the bladder. We have as yet no satisfactory means of showing that morphine might increase the propulsive action of the ureter, but clinical observations would lead one to think that it is quite possible that morphine does increase the propulsive action of

the ureter. We hesitate somewhat to discuss the probable mode of action of morphine upon the human ureter, inasmuch as both anatomical and physical descriptions of the human ureter are lacking in many important details. The action of morphine on excised segments of the ureters would tend to show that the action of morphine was peripheral.[10] Further than that we cannot say with certainty. We have, however, experimental evidence that the popular idea that morphine quiets the ureter is not wholly correct.[11] We have experimental evidence also that morphine in the usual clinical doses increases the tone and amplitude of the ureteral contractions, and it is probable that the action of large doses of morphine is on the central nervous system and dulls the sensorium to the point where the patient is no longer conscious of pain.

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DISCUSSION (*Abstract*)

Dr. D. K. Rose, St. Louis, Mo.—This excellent work and most interesting paper by Dr. Ockerblad explains possibly some of the results obtained in the past by instruments and filiforms devised to remove ureteral stone in that, oftentimes, the removal may be due to the morphine given after the instrumentation. He is not yet, as I understand it, satisfied as to the effect of morphine on the grossly dilated ureter. Emptying a moderately dilated ureter by small catheter which may pass the stone, or a Lau filiform which may bridge past the stone and so unblock, strengthens the expulsive force of the ureter in direct proportion to the emptying; in that contraction, and so thickening, of the ureteral musculature takes place. On this ureter now the effect of morphine is added and the desired results in "happy ending" cases are obtained.

One by one, trial and error practices are explained. I have never seen a stone actually removed, if it were one or two inches up in the ureter or higher, by any form of ureteral stone remover excepting once by a probang with which the ureteral mucosa was also removed, giving an opportunity to remove the kidney later.

Morphine, as offered to us with new clinical hopes by Dr. Ockerblad, is gratefully received by myself and I am sure by all of his medical colleagues. It suggests that, for passing a stone, we allow the patient to get up, force fluids and give morphine when the stone shows a tendency to move.

Dr. Clinton K. Smith, Kansas City, Mo.—Dr. Ockerblad continues to upset our previous conceptions of various things, to our profit. His study of the action of morphine on the autonomic physiology of the ureter has been of particular interest to me, as we have found in our study of enuresis that the action of morphine exerts a beneficial effect in these cases. It probably keeps awake that subconscious inhibition which appears to be the key factor in contemplating the physiological imbalance in this situation.

Dr. Rex E. Van Duzen, Dallas, Tex.—I believe the crux of this question rests on what is the cause of pain in renal colic. If it is due to a foreign body reaction Dr. Ockerblad's work must be accepted. But if it is due to overdistention of renal pelvis and ureter behind the stone, the experiment must be repeated, using different degrees of distention. I suspect we may see different graphs.

THE ROENTGEN STUDY OF MEDIASTINAL TUMORS*

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The information obtained from the roentgen ray in the study of mediastinal tumors is not available by any other method of examination. No especial significance may be given to the clinical manifestations, for they are rarely pathognomonic and may be encountered in a wide variety of lesions. Physical findings are of value, but are not conclusive. Laboratory assistance, other than biopsy, helps only in certain lesions. The responsibility for the detection, the diagnosis, the indication and guide for treatment and, in some instances, the provision of the optimum healing method, is a definite assignment for the roentgenologist.

Until recently the recognition of mediastinal tumors was attained quite late in the course of the disease. The very rarity of their occurrence has prevented the development of wide knowledge concerning them, but the exhaustive study possible by the roentgenological method promises much in the acquisition of information on these conditions.

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The clinical features of these tumors are quite well known and warrant no detailed consideration here. The discovery of mediastinal new growths is facilitated provided they exert pressure upon surrounding structures. More common symptoms are: dyspnea, cough, pain, dysphagia and cyanosis and edema of the face. The most prominent physical sign is the abnormally wide area of dullness across the upper mediastinum. Because of the smaller space to which they are confined, anterior mediastinal neoplasms generally cause more subjective symptoms than do those situated in the posterior mediastinum, and this is true of either the benign or malignant type. Such tumors are frequently confused with lesions of pulmonary, pleural or cardiac origin.

In the posterior mediastinum benign tumors may present few symptoms, and these in slight degree. However, severe pain, even with small lesions, usually accompanies the malignant lesion. Tumors in the upper segment of the posterior mediastinum will present the most marked symptoms because of the more pronounced pressure effects.

Mediastinal tumors may be classified according to the history, the clinical findings, the roentgen studies or the biopsy. They may be primary or secondary in origin. A convenient classification is that proposed by Haagensen:[2]

PRIMARY TUMORS OF THE MEDIASTINUM

(A) Malignant
- (1) Lymphosarcoma
  - (a) Small round-cell lymphosarcoma (malignant lymphocytoma)
  - (b) Large round-cell lymphosarcoma (reticulum-cell lymphosarcoma)
- (2) Hodgkin's disease
- (3) Leukemic lymphoma
- (4) Leukosarcomatosis
- (5) Thymic carcinoma

(B) Benign
- (1) Dermoids
- (2) Other cysts, including echinococcus cysts and ciliated epithelial cysts
- (3) Ganglionic neuromas and nuerofibromas
- (4) Benign connective-tissue tumors, including fibromas, chondromas and lipomas

For the roentgen study all available technics must be employed; the screen observation in all planes, together with roentgenograms, flat and stereoscopic, in such projections as may best demonstrate the lesion. Additional helpful measures are the ingestion of the opaque mixture for delineation of the esophagus and contrast media bronchography. Bucky diaphragm films may reveal osseous changes in the ribs and vertebrae or calcification within the growth.

The roentgen finding of a widened mediastinal shadow practically always indicates a pathological process. Yet such an observation is only the basis from which one proceeds to the clinical differentiation of the nature of the lesion by various methods. A prime differential point is the exclusion of lesions of the aorta, which is not nearly so simple as it might appear.

The roentgen study furnishes data concerning the location, size and configuration of the growth in addition to demonstrating secondary changes, as atelectasis and pleural effusion. While certain criteria have been suggested as furnishing an absolute differential diagnosis in these tumors by the roentgen examination alone, experience shows that this cannot always be true. The shadows produced by mediastinal neoplasms are neither constant in the same individual on separate observations, nor in different individuals affected with the same lesion.

Routine procedures which have demonstrated their value in differential diagnosis where the roentgen ray has shown the presence of mediastinal disease are:

(1) The screen observation
(2) The clinical history
(3) The careful physical examination
(4) The search for adenopathy elsewhere
(5) The complete blood study with Wassermann
(6) The biopsy

Radiation therapy may be of great aid, utilizing the variation in radiosensitivity between these tumors as a basis for differential diagnosis. We refer to the test dose, or largest dose that may be tolerated by the tumor area without damage to normal tissues. The radiation response permits certain conclusions concerning the morphological nature of the tumor; some disappearing rapidly, others more slowly, while others remain refractory. Evans and Witwer[1] have placed mediastinal tumors in four groups according to this behavior phenomena, an assignment not without sources of error, but, nevertheless, of sufficient practical value to recommend its employment.

Lymphosarcoma.—The small round-cell type is exceedingly rare, usually occurs in the thymic region in children and metastasizes widely. The diagnosis may be justified on these facts with the roentgen findings of a mediastinal tumor and a rapid, fatal termination. The roentgen

image is irregular and hazy. The mediastinal contents are generally not displaced. The large round-cell type is the most frequent of all mediastinal tumors and is usually observed as localized multiple nodules and rounded shadows surrounding the bronchi and great vessels. It tends to infiltrate the adjacent tissues and is radiosensitive. Aneurysm must be differentiated.

Hodgkin's Disease.—Long the controversy of pathologists, the recent tendency is to group it with the proliferative lesions arising from the reticulo-endothelial cells. A localized or generalized process, it presents but slight diagnostic difficulty in the typical case because the characteristic cervical lymph node enlargement is an additional aid. Four intrathoracic types have been described by Wessler and Greene:[4] the mediastinal tumor, the infiltrative type, the isolated nodules and the discrete nodes at the lung root. Involvement of the right paratracheal nodes is so frequent as to constitute a major diagnostic point. The roentgen appearance varies with the stage of the disease; multiple glandular enlargements may subsequently appear as one large mediastinal mass. The shadows are considered to be more sharply defined than those of carcinoma, but these clear-cut margins may later infiltrate into the adjacent tissues, completely altering the picture. It is to be differentiated from all benign tumors by its degree of radiosensitivity. The positive determination is by the tissue examination, yet here the pathologists disagree.

Leukemic Lymphoma.—This tumor presents bilateral shadows, resembling lymphosarcoma and Hodgkin's disease, from which it is to be differentiated by the blood examination. Mallory has stated that lymphosarcoma, Hodgkin's disease, lymphatic leukemia and the thymomas are only one stage in the same disease. Bilateral involvement and the multiple, discrete hilar nodes form the characteristic roentgen image.

Leukosarcomatosis.—In this lesion the general features of leukemia are combined with a malignant tumor process having a histologic structure similar to that of sarcoma, according to Sternberg.[3] It presents no roentgenological features which would serve to differentiate it from leukemic leukemia and the diagnosis is based upon the presence of certain large mononuclear blood cells.

Thymic Carcinoma.—Primary carcinoma involving the mediastinum may originate from the bronchi, the esophagus, the thyroid or the thymus. The malignant thymomas grow rapidly, are quite large and infiltrate the surrounding structures. They always occur in the upper anterior mediastinum. The most common type of primary carcinoma giving a mediastinal shadow comes from the bronchi. This may be the small intrinsic bronchial carcinoma giving no characteristic roentgen signs, but likely to be associated with hemoptysis. While direct bronchoscopy is usually essential to diagnosis, contrast media bronchography may show a filling defect within the bronchus. The bronchogenic carcinoma varies in size, is associated with or composed of nodules and infiltrates the lung, most often unilaterally, but may later spread to the opposite side. A differential point is the extension outward from the bronchial trunk. The most characteristic roentgen image is a unilateral infiltrating lesion.

Metastatic malignant tumors may first produce symptoms in the mediastinum, but this is an infrequent site for their manifestation. They usually result from carcinoma of the breast, although they may be of more distant origin. The roentgen image may be that of a mediastinal adenopathy or a single growth.

Benign tumors may produce most distressing symptoms and their diagnosis is usually made only after prolonged observation, noting a continuance of the sharp, regular outline, the lack of growth and no increase in symptoms.

Dermoids.—The reports of successful surgically treated cases would indicate that this is the most frequent mediastinal growth. They are located in the upper anterior mediastinum as sharply defined, asymmetrical masses, in which teeth or bony material may show. The expectoration of hair is a great help in the differential diagnosis. Extraordinarily latent, their symptoms most often develop in the second decade as pain in the chest, cough, dyspnea, and may persist throughout the life of the individual. Secondary malignant degeneration is not uncommon. Quite radioresistant, but one treated case has been reported.

Neurogenic Tumors.—Ganglionic neuromas arise from the sympathetic ganglia, lying in the costovertebral angle, and have been reported only as asymmetrical and unilateral tumors. The neurofibromas arise from the nerve sheaths in this region and are usually bilateral and symmetrical. They are definitely radioresistant.

SUMMARY

Roentgenological study is of prime importance in the diagnosis of mediastinal tumors, but for the accurate determination of the nature of

the lesion there must be correlation of the clinical features, laboratory studies and roentgen findings. The response of the tumor to a test dose of radiation is a valuable supplemental aid.

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DISCUSSION (*Abstract*)

Dr. Ira H. Lockwood, Kansas City, Mo.—There is probably no definite increase in the incidence of mediastinal lesions, but certainly there are many more reported cases in the literature now than there were formerly. This is probably due to a more careful and thorough examination of the individual who complains of respiratory embarrassment and who may have edema of the face, neck or upper extremities, rise of temperature, dry cough, hoarseness, dysphagia, pain, disturbance of the basal rate, dilated veins of the upper thorax and enlarged glands above the clavicle.

To understand mediastinal lesions one must recall that the mediastinal space is a term applied to the area between the lungs, the vertebral column and the sternum. This is divided into a superior, middle, posterior and anterior portion in order of their importance.

The superior portion contains the aortic arch and the three great vessels which spring from it; the innominate veins, the upper part of the superior vena cava, trachea, thoracic duct, esophagus, phrenic, pneumogastric, left recurrent laryngeal and cardiac nerves and the thymus gland.

The middle portion contains the pericardium and its contents as well as the phrenic nerves and their accompanying vessels.

The posterior portion contains the descending thoracic duct, left aortic intercostal arteries, azygos veins, thoracic duct, esophagus and the pneumogastric nerves. The anterior portion contains a few lymph nodes, areolar tissue and lymphatic vessels.

The diagnosis must be made from the history, clinical and laboratory findings, roentgen examination and the microscopic study of tissue removed, bronchoscopy and bronchography, remembering that the structures primarily involved are the large veins, heart, trachea, esophagus, thoracic duct, thymus gland, lymph nodes in the mediastium, vagus nerve, recurrent laryngeal, phrenic and the sympathetic trunks, and that secondary tumors arise from lesions of the stomach, lungs, breast, esophagus, bronchi and from inflammatory changes, chiefly tuberculosis.

The diagnosis of tumors of the superior mediastinum may present difficulties because of varying size, shape and density of the same type of tumors in different individuals. The tumors most commonly found in this region are: (1) thymoma, (2) lymph node tumors. Whether one calls them lymphosarcoma or lymphoblastoma is of little concern, because the only difference is the use of a genetic term. (3) The extension into the mediastinum forms a primary bronchiogenic carcinoma, and one must be aware of the frequent obstruction of the superior vena cava and the resulting thrombosis. (4) Ganglionic neuroma, which may slowly grow to enormous size. (5) Dermoid cysts and the extrinsic tumors of the thyroid, esophagus and aneurysm.

The roentgen ray plays an important part both from its diagnostic and therapeutic application and the roentgenologist must consider the size, shape, contour and the relation of the lesion to surrounding structures and the secondary changes due to pressure, as atelectasis or pleural effusions. The latter may be due to either secondary involvement or pressure on some of the main vessels. Whether the lesion is unilateral, bilateral, movable or fixed, pulsates or displaces other structures, an attempt should be made to differentiate primary and secondary lesions, and to determine whether they are benign or malignant.

INVESTIGATIONS CONCERNING HOOKWORM DISEASE IN SOUTHERN STATES WITH SUGGESTIONS FOR CONTINUED CONTROL*

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During the past six years investigations have been conducted concerning the incidence and intensity of hookworm infestation in several southern states. This work has been done in each state in cooperation with the department of health to determine the progress that has been made in the control of hookworm in the areas studied. The findings have been obtained under comparable conditions and afford accurate information not only as to localization and prevalence, but also as to the severity of infestation. These data will enable the departments of health concerned to institute measures for the continued reduction in the incidence of hookworm and possibly its ultimate eradication.

The data showing the incidence of hookworm in these states during the period 1910-1914 were obtained from the annual reports of the Rockefeller Sanitary Commission. They are based on the results of the microscopic examination of feces by the smear method, which was the technic

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then usually employed. The present data, however, are based on the examination of specimens of feces by the small drop dilution egg-count method described by Stoll and Hausheer. Although the two methods of examination are different, it has been shown as a result of the examination of a series of specimens (Keller, 1934) by both methods that the egg-count technic is somewhat more accurate in the diagnosis of hookworm than the smear method. It is believed, therefore, that the data made available by recent studies are more dependable than those obtained in the early investigation.

The data herein presented cover the period 1929-1935 and were compiled as a result of our own investigations. As a basis for comparison of the hookworm problem in Kentucky, Mississippi, South Carolina and Tennessee, all of the counties reported for the period 1910-1914 were included in the studies for the period 1929-1935; however, there are counties not included in the data for the early period which are represented in these investigations.

The data for the period 1929-1935 were compiled as a result of the examination of all groups in the population in each state. However, from 60 to 75 per cent of the specimens examined were obtained from individuals of school age, 6 to 18 years, inclusive. This distribution of specimens is comparable with the age distribution of those examined during 1910-1914. The specimens were collected and examined according to family groups in each community. As many persons as possible in each family were examined. Only white individuals residing in rural areas are included in this analysis.

The present investigations include 2,035 communities in 167 counties. No information is available as to communities and family groups in the early studies, but data were obtained from 130 counties. The results herein presented represent examinations from as many as 37,826 families.

Table 1 shows an analysis of the incidence of hookworm in these four states. The analysis of the state-wide study of South Carolina has been completed, but only eight counties* in the sandy coastal plain region of the eastern part of that state are included at this time. These counties are representative of the general hookworm region of the state, and the data which are included in this analysis are essentially in agreement with the results obtained from the state as a whole.

The average incidence of hookworm among 205,825 persons in these four states during 1910-1914 was 41.8 per cent as compared with 14.1 per cent found in these investigations among 106,577 individuals. The data indicate an average decrease of 66.3 per cent in the incidence of hookworm in these areas since the campaign for the control of hookworm by the Rockefeller Sanitary Commission (1910-1914).

The decrease in incidence by states is greatest in Kentucky and Tennessee. There has occurred in Kentucky a decline from 37.4 per cent to 8.5 per cent, or a total of 77.3 per cent; in Tennessee a reduction from 25.4 to 6.8 per cent, or a total of 73.2 per cent; in Mississippi there has been a decrease from 53.1 per cent to 19.6 per cent, or a total of 62.3 per cent; and in South Carolina (eight counties) the data show a decrease of from 51.5 to 33 per cent, or a reduction of only 35.9 per cent.

These observations indicate that the climatic and soil conditions limit the transmission of

*Unpublished data.

Table 1

INCIDENCE OF HOOKWORM IN KENTUCKY, MISSISSIPPI, SOUTH CAROLINA AND TENNESSEE, 1910-1914 AND 1929-1935

State	1910-1914				1929-1935				Per Cent Reduction in Incidence
	No. Counties	No. Examined	No. Positive	Per Cent Positive	No. Counties	No. Examined	No. Positive	Per Cent Positive	
Kentucky	26	78,887	29,504	37.4	36	23,964	2,045	8.5	77.3
Mississippi	52	80,688	42,845	53.1	52	44,380	8,694	19.6	62.5
South Carolina	8	7,322	3,771	51.5	8	6,234	2,056	33.0	35.9
Tennessee	44	38,928	9,888	25.4	71	31,999	2,196	6.9	73.2
Total	130	205,825	86,008	41.8	167	106,577	14,991	14.1	66.3

hookworm in Kentucky and Tennessee, while in Mississippi and South Carolina all conditions prevail necessary for the propagation of hookworm larvae in the soil. Moreover, Kentucky and Tennessee border on the upper limits of the hookworm belt of the world as described by Chandler. Analysis of the climatic and soil factors in these states shows that there is a relatively short period during the year when the temperature is favorable for the development of hookworm larvae. Although there are sandy soil areas in Kentucky and Tennessee, the sand is not homogeneously distributed over large areas as it is in the coastal plains of Mississippi and South Carolina; in these states the climatic and soil conditions are exceedingly favorable for the development of hookworm larvae.

Because of these differences, the areas in Kentucky and Tennessee in which the incidence of hookworm is 10 per cent or higher constitute a relatively small part of the state; in Tennessee 5.3 per cent and in Kentucky 6.6 per cent of the white population reside in counties where the incidence of hookworm is 10 per cent or greater, while 28 per cent of the white population in Mississippi and about 57.0 per cent in South Carolina reside under similar conditions.

The incidence of hookworm by age groups is similar in each state. In both males and females the incidence is low in the age group 0-4 years; there is a rapid rise in the age group 5-9 years; and the peak is reached in the age period 15-19 years. There is a sharp decline at 30 years of age. The males show a higher incidence in each state than the females. This is especially striking in the school age periods.

In discussing the intensity of infestation of hookworm, Table 2 shows the classification of hookworm infestation as described by Smillie and Augustine.

Table 2

CLASSIFICATION OF HOOKWORM INFESTATION ACCORDING TO SMILLIE AND AUGUSTINE

Group	Clinical Classification	Approx. No. Hookworms	Eggs per c. c. of Feces
1	Very light	1- 25	200- 699
2	Light	26- 50	700- 1,299
		51- 100	1,300- 2,599
3	Moderate	101- 500	2,600-12,599
4	Heavy	501-1,000	12,600-25,099
5	Very heavy	1,001 and over	25,100 and over

It is difficult to determine at what intensity of hookworm infestation clinical symptoms are likely to appear, but for practical purposes an infestation of 2,600 eggs per c.c. of feces, or approximately 100 hookworms, is found to be the level at which symptoms will probably occur. This classification has been used throughout the recent studies. Table 3 shows the distribution of the total positive cases according to intensity of infestation in terms of the number of hookworm eggs per c.c. of feces.

Table 3

INTENSITY OF INFESTATION OF 14,987 CASES OF HOOKWORM, ACCORDING TO SEX

Intensity of Infestation, Eggs per c. c. of Feces	Total Positive in Each Group	Per Cent Positive in Each Group	Males		Females	
			Total Positive in Group	Per Cent Positive in Group	Total Positive in Group	Per Cent Positive in Group
200- 699	4,926	32.9	2,596	30 9	2,330	35.5
700- 1,299	4,158	27.7	2,289	27.2	1,869	28.4
1,300- 2,599	2,304	15.4	1,315	15.6	989	15.1
2,600-12,599	3,001	20.0	1,839	21.8	1,162	17.7
12,600-25,099	384	2.6	238	2.8	146	2.2
25,100 and over	214	1.4	141	1.7	73	1.1
Total	14,987	100.0	8,418	100.0	6,569	100.0

Table 3 shows the distribution of intensity of infestation of 14,987 cases of hookworm in males and females. Of the entire group of cases 76 per cent were found to have less than 2,600 eggs per c.c. of feces, or less than 100 hookworms. The analysis also shows that there were more males than females, with intensity levels of 2,600 eggs or more per c.c. of feces. Of the 8,418 cases in males, 26.3 per cent were found to harbor 100 or more hookworms; of the 6,569 cases in females, only 21 per cent had a similar intensity of infestation.

In analyzing the intensity of hookworm infestation Table 4 shows that for each state there were more males than females with worm burdens of 100 or more hookworms. In Kentucky, where the incidence of hookworm was 8.5 per cent, only 17.8 per cent of the positive cases had an intensity level of 100 or more hookworms; in Tennessee there was an incidence of 6.9 per cent and 21.7 per cent of all persons infested had 100 or more hookworms; in Mississippi there was an incidence of 19.6 per cent, with 24.1 per cent of the positive cases harboring 100 or more worms. However, the eight counties in South Carolina showed the highest incidence of any state and also the largest per cent of persons with worm burdens sufficient to produce symptoms. In this group of counties, which are representative of the hookworm region in this state, the incidence

Table 4

DISTRIBUTION OF 14,987 CASES OF HOOKWORM BY STATES ACCORDING TO INTENSITY OF INFESTATION

Intensity of Infestation. Eggs per c. c. of Feces	Kentucky				Tennessee				Mississippi				South Carolina			
	Male		Female		Male		Female		Male		Female		Male		Female	
	No. Pos.	% Pos.	No. Pos.	% Pos.	No. Pos.	% Pos.	No. Pos.	% Pos.	No. Pos.	% Pos.	No. Pos.	% Pos.	No. Pos.	% Pos.	No. Pos.	% Pos.
200- 699	367	33.7	296	31.0	506	42.0	408	41.4	1514	30.3	1399	37.7	209	18.5	227	24.5
700- 1299	351	32.2	307	32.2	258	21.4	219	22.2	1394	27.9	1075	29.0	286	25.3	268	28.9
1300- 2599	162	14.9	196	20.5	180	14.9	144	14.6	730	14.8	455	12.3	243	21.5	194	20 9
2600-12599	188	17.2	140	14.7	212	17.5	174	17.9	1129	22.8	632	17.2	310	27.5	216	23.3
12600-25099	13	1.2	12	1.2	34	2.8	19	1.9	142	2.6	96	2.6	49	4.3	19	2.0
25100 and over	9	0.8	4	0.4	17	1.4	21	2.1	83	1.6	45	1.2	32	2.8	3	0.3
Total	1090	100.0	955	100.0	1207	100.0	985	99.9	4992	100.0	3702	100.0	1129	99.9	927	99.9

of hookworm was 33 per cent, and 30 per cent of all infested individuals had 100 or more hookworms.

Table 5 shows that the lowest intensity of infestation was found in Kentucky, the average being 2,000 eggs per c.c. of feces, or approximately 80 hookworms. There is no significant difference between the intensity levels in males and females in that state, there being generally a light hookworm burden throughout the areas studied. In Mississippi there was an average of 2,400 eggs per c.c. of feces, or approximately 96 hookworms per person based on the total positive cases. There was an average of 108 worms for males and 92 for females. In Tennessee the total average intensity of infestation was found to be 2,900 eggs per c. c. of feces, or approximately 116 hookworms. There was an average of 104 worms in males and 132 worms in females, which is the highest for females found in any state in this series of studies. These data for Tennessee are of particular interest because the incidence of hookworm was only 6.9 per cent, which indicates that even in areas of low incidence persons may be found with heavy worm burdens. The highest average intensity of infestation was found in South Carolina; the total average was 3,100 eggs per c.c. of feces, or 124 worms. The average intensity for males was 4,100 eggs per c.c. of feces, or approximately 164 hookworms, and for females there was an average intensity of 2,500 eggs per c.c. of feces, or 100 hookworms.

Table 5

AVERAGE INTENSITY OF INFESTATION FOR MALES AND FEMALES IN KENTUCKY, MISSISSIPPI, SOUTH CAROLINA AND TENNESSEE

State	Average Intensity: Eggs per c. c. of Feces	Approx. No. of Hookworms	Males		Females	
			Average Intensity: Eggs per c. c. of Feces	Approx. No. of Hookworms	Average Intensity: Eggs per c. c. of Feces	Approx. No. of Hookworms
Kentucky	2,000	80	2,100	84	2,000	80
Mississippi	2,400	96	2,700	108	2,300	92
S. Carolina	3,100	124	4,100	164	2,500	100
Tennessee	2,900	116	2,600	104	3,300	132

Table 6

AN ANALYSIS OF HOOKWORM ACCORDING TO FAMILY GROUPS

State	Total No.of Families Studied	Total No. of "Positive" Families	Per Cent of "Positive" Families	Total No. Examined in "Positive" Families	Total No. Persons in "Positive" Families	Incidence of Hookworm in "Positive" Families
Kentucky	8,368	1,271	15.2	4,816	1,980	41.1
Tennessee	14,096	1,399	9 9	4,451	2,142	48.1
Mississippi	12,892	4,372	33.9	17,879	8,497	47.5
S. Carolina	2,470	1,079	43.7	3,672	2,074	56.5

Table 6 contains data showing the problem of hookworm as related to the family groups studied in each state. The term "positive" is used to denote a family group in which one or more members were found to have hookworm eggs in the feces. The data show that 15.3 per cent of the families examined in Kentucky and 9.9 per cent of those examined in Tennessee had one or more members infested with hookworm. This is in striking contrast to the large number of "positive" families in Mississippi and South Carolina. The data show that of the families studied there were in the latter two states 33.9 and 43.7 per cent, respectively, with one or more members with hookworm. It is evident that hookworm infestation is concentrated in a

relatively small number of families in Kentucky and Tennessee, while in Mississippi and South Carolina a large per cent of the families studied were found to have one or more members infested with hookworms. Obviously there is need for continued emphasis on the "control" of hookworm disease.

Table 6 shows that an average of from 41.1 per cent to 56.5 per cent of the members of "positive" families were found to have hookworm. These figures are probably somewhat higher than they should be, because it was not possible to examine every member of each household. These data, however, show that hookworm infestation is a family problem and that when a member of a family is found to be infested the others should also be examined not only to control the disease in the family group but also to remove foci of infection from the community.

Table 7

INFESTED PERSONS PER FAMILY AND THE AVERAGE INTENSITY OF HOOKWORM INFESTATION PER INFESTED INDIVIDUAL

No. Infested Persons per Family	Kentucky		Tennessee		Mississippi		S. Carolina	
	Average Egg Count per Person. Eggs per c. c. of Feces	Approx. No. of Hookworms	Average Egg Count per Person. Eggs per c. c. of Feces	Approx. No. of Hookworms	Average Egg Count per Person. Eggs per c. c. of Feces	Approx. No. of Hookworms	Average Egg Count per Person. Eggs per c. c. of Feces	Approx. No. of Hookworms
1	1,400	56	1,500	60	1,600	64	2,100	84
2	1,900	78	2,500	100	2,300	92	3,000	120
3	2,400	96	3,900	156	2,400	96	3,000	120
4	2,200	88	4,400	176	4,000	160	4,200	168
5 and over	3,300	132	6,400	256	5,500	220	6,200	248

The data relative to family groups also show that as the number of infested persons per family increases the average individual worm burden increases. As a result of an increase in the number of infested persons per family, greater opportunity is afforded for building up heavy infestations due to an increase in soil pollution. Table 7 shows that for each state there is an increase in the individual worm burden as the number of infested persons per family increases. When only one person in a family had hookworm, the intensity was light, varying from approximately 56 to 84 hookworms. As the number of infested persons per family increased to five or more, the worm burden increased to 132 hookworms in Kentucky and to more than 200 per person in Tennessee, in Mississippi and in South Carolina. With the exception of Kentucky, where the smallest number of moderate and heavy infestations were found, there is not much variation in the average worm burden with reference to the same number of infested persons per family in each of the other states.

DISCUSSION

The data presented indicate that there has occurred an average decrease of 66.3 per cent in the prevalence of hookworm in the states in which investigations have been made. While data showing the intensity of infestation during 1910-1914 are not available, there is no doubt that a marked lowering of the intensity of infestation has accompanied the decline in the incidence of hookworm. An analysis of the intensity of infestation of the 14,987 cases found in the present investigation shows that 24 per cent of these individuals had an intensity of infestation of 2,600 or more eggs per gram of feces, or approximately 100 or more hookworms, which is the intensity level at which clinical symptoms are likely to appear. Recent clinical studies (Keller, *et al.*, 1935) have shown also that only 21.6 per cent of 861 children with hookworm had sufficient worm burdens to produce symptoms.

Several factors have been responsible for these results. Treatment which was administered to large numbers of persons during the Rockefeller Sanitary Commission campaign and since that time in certain areas has been conducive to lowering the intensity of infestation to the present level. Unfavorable climatic conditions limit the spread of hookworm, especially in Kentucky and Tennessee, and make it possible for hookworm larvae to develop in the soil only for a short period during the year.

Proper excreta disposal has not been observed uniformly. However, the Federal agencies have cooperated with state and local health organizations in field operations for building sanitary privies. The emphasis which is now being placed upon this phase of rural sanitation should greatly accentuate the value of proper excreta disposal.

While the results of efforts toward the control of hookworm have been effective, there still remain areas in these states where hookworm constitutes a public health problem. In each of the states represented in these studies there remain cases of heavy hookworm infestation distributed throughout the communities investigated. These are found as a rule in the more remote and isolated districts where for various reasons an adequate public health service has not been established.

The continued reduction in incidence and intensity of hookworm infestation is a responsibility of the states concerned. In the First Annual Report of the Administrative Secretary of the Rockefeller Sanitary Commission the following principles were pointed out:

"Each state has its own system of public health, its own system of organized medicine, its own organized public press, its own system of public schools—these four fundamentals and a host of minor agencies which can be used to advantage in educating the people. These are established institutions rooted in the life and traditions of the people; to enlist these agencies in the accomplishments of the task is to insure the permanency of the work from the beginning.

"The eradication of this disease, moreover, is a work which no outside agency working independently could do for a people if it would, and one which no outside agency should do if it could. The economic prosperity of the state, the lives and health of its people, and the education of its children are involved; if the infection is to be stamped out, the states in which it exists must assume the responsibility. An outside agency can be helpful only in so far as it aids the states in organizing and bringing into activity their own forces."

CONCLUSIONS

The data presented show that there exist hookworm problems of varying extent in the areas studied. Continued effort should be made to institute measures which would be effective in permanently controlling this disease. It should be possible by instituting proper methods of excreta disposal to reduce the incidence and intensity of hookworm infestation to the point where there will be only "residual" infection in a community.

In those communities where heavy infestations are found treatment should be administered in order to improve the physical condition of those infested. Effective treatment will also serve to stimulate interest in this problem and at the same time afford opportunity to do educational work which may eventually lead to the institution of proper methods of excreta disposal. While treatment may bring about improvement in the health of individuals with hookworm, its effects will be temporary, unless reinfection is prevented.

Investigations should be continued by each state department of health in areas where a hookworm problem exists. They can be carried on by the official local health departments as a part of their routine activities. The medical profession should be informed of the results and the cooperation of practitioners of medicine should be enlisted in the treatment of cases. Further reductions in the incidence and intensity of hookworm infestation will depend upon the institution of measures which have been discussed and upon the development and maintenance of a more adequate local health service.

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DISCUSSION (*Abstract*)

Dr. D. G. Gill, Montgomery, Ala.—There has been a tendency in recent years to consider hookworm disease in the Southern United States as a problem of the past and one that has been controlled. That this is not the case is amply revealed by the statistics of this paper. True, there has been a very gratifying decrease both in the incidence and in the intensity of the infection in the four states studied, but with 14 per cent of the people examined still showing hookworms the problem is far from obsolete.

In Alabama last year we began a state-wide survey of school children to obtain a true picture of the present situation. Seven counties in the southern part of the state revealed an incidence rate of 36.8 per cent and an average worm burden of approximately 100 worms per child, which means that a great many are still suffering from "hookworm disease." This year the survey is being extended to all parts of the state and we are defining those counties in which control measures have not proven adequate.

Treatment of infected individuals is, of course, one method of control, but like the giving of typhoid vaccine in typhoid fever work, it is not the permanent, fundamental method. Proper disposal of human excreta is the real answer and, as we all know, sanitary privies are far from universal. It is only in the past few years that we have been able to have many of our rural schools sanitated and even yet an appreciable number are serving as disseminators of hookworms as well as of learning.

Rural health service in the South was greatly stimulated by the early hookworm campaigns, but in the development of programs the multiplicity of problems

has frequently led to the submersion of this basic problem. They are not universal, of course, but in those areas where soil and temperature are right, hookworms still thrive and still offer a challenge to sanitarians.

Dr. Keller (closing).—In reply to Dr. Ferrell's question as to whether or not it was possible to determine if the decrease in the incidence of hookworm infestation has been greater in counties with full-time health departments than in counties without full-time health departments, I wish to say that we have attempted to determine this point. After an analysis of the data from counties with full-time health departments and counties without full-time health departments, we were not able to determine that there was any difference in the rate of decrease in the incidence of hookworm.

THE EFFECT OF VARIOUS ANALGESICS ON THE NEW BORN*

By MILTON SMITH LEWIS, M.D.
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Recognition of the relationship of certain analgesics administered to the mother during labor, to narcosis in the new born suggests the desirability of a more accurate knowledge of their effect on the baby.

The greatest disadvantage in the use of analgesics during labor, in the minds of many physicians, is the fear of the depressing effect on the respiratory center of the infant. That narcotics can affect the new born adversely no one can doubt, and the incidence of narcosis is one to be seriously considered in any type of medication during labor.

Recent literature abounds with reports concerning the use of various analgesics to relieve the pains of child birth, but few detailed studies have appeared of their effect on the new born.

Shute and Davis[1,2] have reported that narcosis of the new born may be exaggerated following the administration of morphine to the mother during labor. Since during the time when the drug is supposed to act most strongly on the baby only 50 per cent of infants are affected by it to any noticeable degree, they believe that it is a safe drug to use during labor when adequate means of resuscitation are at hand. Murphy and Sessums[3] reported that narcosis following analgesia administered to the mother was the most common cause of respiratory depression in their series of sixty-six infants.

Bosse[4] and Bass[5] report an incidence of 10 to 20 per cent of asphyxiated babies when morphine and scopolamine were used during labor. Krebs'[6] experiment seems to prove that the use of alkaloids of opium is likely to interfere with the prompt establishment of respiration of the new born. DeLee[7] says that narcotics may affect the child adversely when given in the second stage of labor, but only when the drugs are improperly administered and in doses that would endanger the mother; if they are "given at the proper time and in the proper dosage the child is not in danger." Irving, Berman and Nelson[8] state that all hypnotic drugs given to the mother may delay somewhat the initial respirations of the infant.

Drabkin, *et al.*,[9] Robbins, McCallum, *et al.*,[10] report that babies of mothers kept under sodium iso-amylethyl barbiturate ("amytal") anesthesia during labor were not narcotized. Littell[11] concluded that the sodium salt of this barbiturate has no injurious effect on the new born child when it is given in the customary doses as an obstetrical analgesia or anesthetic. Roucek and Renton[12] in a recent study on white rats found that the amount of "amytal" necessary to anaesthetize a pregnant rat did not in any way interfere with the viability of the fetus; the fetus was not anesthetized and readily responded to gross stimulation. Birnberg and Livingston[13] report in their studies with di-allyl barbituric acid ("dial") that narcosis of the baby is increased, but all were easily resuscitated with carbon dioxide and oxygen.

Since much controversy is waged over the subject of narcosis of the new born, we feel that any statement on our part should be backed by our experience in a definite number of cases.

Our primary aim was to study a series of infants the mothers of whom had received analgesics during labor, and to determine as far as possible what effects these drugs, alone or in combination, had on the new born.

Our series of 515 infants is not a very large one, but they have all been observed carefully and an earnest effort has been made to evaluate accurately the results in each group.

All the infants in the series were examined by the author immediately after delivery and observed twice daily during their stay in the hospital. There were no selected cases.

Fifteen babies in this series were stillborn.

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The summary of circumstances surrounding the cause of death, dose of drug, the interval between administration and delivery and anesthesia used for termination of labor are shown in Table 1. No baby in this group was lost as a result of narcosis from any of the analgesics administered.

The remaining cases were classified into four main groups for tabulation and study.

Group 1 includes all cases that received morphine and scopolamine.

Group 2 includes all cases that received morphine, scopolamine and sodium iso-amylethyl barbiturate.

Group 3 includes all cases that received sodium iso-amylethyl barbiturate only.

Group 4 includes all cases that received no analgesic, but to whom gas oxygen anesthesia was administered for completion of the second stage of labor.

GROUP 1—MORPHINE AND SCOPOLAMINE

One hundred and twelve mothers received this combination. Three of the babies were stillborn, leaving 109 cases for study and tabulation. Of these, eighty-eight mothers were primiparae and twenty-one were multiparae.

Seventy-seven cases were delivered spontaneously: with seven, or 9.9 per cent, of the babies the respiration were depressed; five were deeply narcotized and two were slightly narcotized, but all were easily resuscitated.

There were thirty-two operative deliveries: with nine, or 28.1 per cent, of the babies the respiration was depressed. They were only slightly narcotized and responded readily to carbon dioxide and oxygen resuscitation.

The sixteen cases that were narcotized received the following dosage. Of the seven narcotized babies in the spontaneous group:

Three mothers received morphine 1/4, scopolamine 1/150

One received an additional 1/200 of scopolamine

Two received morphine 1/6, scopolamine 1/250

One received morphine 1/6, scopolamine 1/300

The average time between administration and delivery was one to four hours.

Of the nine narcotized babies in the operative group:

Two mothers received morphine 1/6, scopolamine 1/150

One received morphine 1/6, scopolamine 1/75

Four received morphine 1/4, scopolamine 1/150

One received morphine 1/2, scopolamine 1/55

One received morphine 1/2, scopolamine 1/100

The average time between administration and delivery was one and one-half hours to eight hours.

1½ hours 1 case
5 hours 3 cases
6 hours 1 case
7 hours 2 cases
8 hours 2 cases

Of the remaining ninety-three cases in which the respirations were not affected:

Twenty-five mothers received morphine 1/4, scopolamine 1/150

Twenty-seven received morphine 1/3, scopolamine 1/75

Table 1

Cause of Death	Cases	Analgesic	Hours Before Delivery	Anesthesia
5 Versions	2	None		
	1	M 1/6 S 1/200	4	
	1	M 1/4	2	Gas-ether
	1	M 1/3 S 1/250	12	
		S 1/300 A 15	8	
4 Intra-uterine asphyxia (autopsy)	1	M 1/4 S 1/75	14	
		M 1/6 A 6	11	None
		S 1/200 A 6	6	
	1	S 1/300 A 7 1/2	5½	Gas
	1	M 1/4 S 1/150 A 12	6	None
	1	S 1/200 A 12	8	Gas
2 Cord around neck (F. H. not heard)	1	M 1/6 S 1/200 A 13 1/2	8	Gas
	1	M 1/4 S 1/150	5	Gas
2 Congenital atelectasis with enlarged thymus (autopsy)	1	None		None
	1	M 1/4 S 1/150 A 3	20	
		S 1/150 A 6	12	None
		M 1/6 S 1/200 A 6	6	
		A 6	2	
Cerebral hemorrhage (forceps)	1	M 1/6 S 1/200	24	Gas
1 Placenta previa totalis	None			Gas

Forty-one received morphine 1/6, scopolamine 1/150

The time between administration and delivery varied from two to twelve hours.

2 hours 4 cases
2-4 hours 26 cases
4-6 hours 22 cases
6-8 hours 12 cases
8-12 hours 29 cases

GROUP 2—MORPHINE, SCOPOLAMINE AND ISO-AMYLETHYL BARBITURATE

One hundred and sixty-seven cases received this combination: seven were stillborn, leaving 160 cases for study and tabulation. One hundred and ten were primaparae and fifty were multiparae. Eighty-six delivered spontaneously, seventy-one were delivered by forceps, three were breech deliveries.

In the eighty-six cases that delivered spontaneously, there were nine infants, or 14.6 per cent, in whom the respirations were depressed. All were slightly narcotized and easily resuscitated.

In the seventy-four operative deliveries there were twenty-one babies, or 28.3 per cent, in whom the respirations were depressed. All were slightly narcotized and easily resuscitated.

The thirty cases that were narcotized received the following doses. Of nine cases that delivered spontaneously:

Seven received morphine 1/4, scopolamine 1/150, iso-amylethyl barbiturate 7 to 12 grains

Two received morphine 1/4, scopolamine 1/75, iso-amylethyl barbiturate 12 to 19 grains

The average time between administration and delivery varied from two to six hours

2-4 hours 7 cases
4-6 hours 2 cases

Of the twenty-one cases in the operative group:

Seven received morphine 1/4, scopolamine 1/85, barbiturate 6 to 15 grains

Six received morphine 1/6, scopolamine 1/150, barbiturate 7 to 15 grains

Four received morphine 1/4, scopolamine 1/150, barbiturate 6 to 15 grains

Two received morphine 1/2, scopolamine 1/150, barbiturate 15 to 25 grains

One received morphine 1/2, scopolamine 1/200, barbiturate 6 grains

One received morphine 1/3, scopolamine 1/150, barbiturate 15 grains

The time between administration and delivery varied from two to eight hours

2-4 hours 12 cases
4-6 hours 5 cases
6-8 hours 4 cases

Of the remaining 131 cases in which the respirations were not affected:

Eighty-one received morphine 1/4, scopolamine 1/150, barbiturate 9 to 20 grains

Thirty received morphine 1/6, scopolamine 1/75, barbiturate 6 to 15 grains

Twenty received morphine 1/2, scopolamine 1/150, barbiturate 9 to 20 grains

The time between administration and delivery varied from one to twelve hours

1-2 hours 18 cases
2-4 hours 27 cases
4-6 hours 36 cases
6-8 hours 18 cases
8 hours plus 32 cases

GROUP 3—SODIUM ISO-AMYLETHYL BARBITURATE

One hundred and forty-seven cases received sodium iso-amylethyl barbiturate alone. Gas oxygen was used in 121 cases for completion of the second stage of labor and twenty-six received chloroform. There were no stillbirths in this group. Sixty-eight were primiparae and seventy-nine were multiparae. One hundred and seventeen delivered spontaneously. Thirty were operative deliveries.

In the 117 spontaneous deliveries there were two babies, or 1.7 per cent, that did not breathe spontaneously. Both were slightly narcotized.

Among the thirty operative deliveries, there were four babies, or 13.3 per cent, whose respirations were depressed. All were slightly narcotized and easily resuscitated.

The six cases that were narcotized received the following dosage:

Three cases received 9 to 15 grains
Three cases received 12 to 18 grains
Time interval before delivery was one to six hours

1-2 hours 1 case
2-4 hours 3 cases
4-6 hours 2 cases

The dosage in the 141 cases that were not narcotized was as follows:

Sixty-eight cases received 9 to 15 grains
Sixty-two cases received 6 to 15 grains
Eleven cases received 12 to 20 grains
The time interval before delivery was as follows

1-2 hours 20 cases
2-4 hours 105 cases
4-6 hours 10 cases
6-8 hours 6 cases

GROUP 4—NO ANALGESIA

There were eighty-three cases that received only gas oxygen for the completion of the second stage of labor. Gas oxygen was adminis-

tered from one to four hours before delivery. Nineteen were primiparae and sixty-four were multiparae. Seventy-one delivered spontaneously and twelve were operative deliveries.

Respirations were depressed in three babies that delivered spontaneously.

Of the twelve operative cases, two did not breathe spontaneously, one was a breech delivery, and there was one posterior position with low forceps delivery.

As there was some doubt as to the cause of the respiratory depression in the five babies in this group, they were classified as narcotized. They were easily resuscitated.

The effect of the drugs on the production of asphyxia or narcosis is very difficult to determine. Narcotized babies resemble the asphyxia livida type, but there are a few distinguishing features: for instance, they usually take a preliminary respiration and then lapse into apnea; they are not so blue as in the usual case of asphyxia livida; they move spontaneously, but respond poorly to external stimuli, but respond to gas resuscitation almost immediately. If, on the other hand, the baby is limp, bluer than usual or pallid and does not respond readily to gas resuscitation, one may be fairly certain that factors other than the drugs are responsible for the delay in respiration.

In those infants in whom a delay in respiration occurred at birth, a search for the cause was made, and after the eliminaton of those cases complicated by obstetrical difficulties (cord around the neck, obstruction of the respiratory tract and excessive traumatism of labor) the remaining cases were classified as narcotized. With these criteria, the incidence of narcosis was as follows:

Table 2

Analgesia	No. of Cases	Not Narcotized	Narcotized	Per Cent
Group 1—Morphine and scopolamine	109	93	16	14.6
Group 2—Morphine, scopolamine and barbiturate	161	131	30	18.6
Group 3—Sodium iso-amylethyl barbiturate	147	141	6	4.8
Group 4—No analgesia	83	78	5	6.2
Total	500	443	57	11.4

Of the fifty-seven infants in whom the delay in respirations occurred, fifty-two were slightly narcotized. The remaining five were deeply narcotized and required in addition to gas resuscitation respiratory stimulants. All the narcotized babies were discharged home alive.

In the 443 infants in whom spontaneous respirations occurred, the cry was indistinguishable from the infants that were narcotized.

In reviewing these cases we soon learned the difficulty of determining accurately the influence of these drugs on the babies. It has recently been shown by Shute and Davis that narcosis of the new born can be influenced by a variety of factors, and that also there is an extraordinary variability in the manner in which different babies will react to identical conditions. The important factors are: trauma of labor, the size of the dose, the interval between administration of the analgesia and delivery, the effect of the drug on the mother and the anesthesia; all of which may be of equal importance.

Careful consideration of all these factors was made to determine the effects of the analgesics on the new born.

TRAUMA OF LABOR

Delivery		Narcosis		No Narcosis	
		No.	Per Ct.	No.	Per Ct.
Operative	148	36	24.3	112	75.6
Spontaneous	352	21	5.9	331	94
Total	500	57	11.4	443	88.6

Infants who have been subjected to long or difficult labor are definitely more susceptible to narcosis from all analgesics administered. This is well illustrated in the 148 operative deliveries in which thirty-six infants, or 24.3 per cent, showed evidence of narcosis in comparison with 352 spontaneous deliveries in which only twenty-one infants, or 5.9 per cent, were narcotized. The operative group did not receive any larger dose than those in the spontaneous group. Seventeen infants, or 47.8 per cent, however, received the various analgesics between the second and sixth hour before delivery, the time in which the drugs have their maximum effect on the infant. Therefore, we should particularly like to emphasize the fact that where operative procedures are anticipated the drugs administered to the mother should be used sparingly and with care, since the infants which have been traumatized may not tolerate in addition any medication that may affect the respiratory system.

SIZE OF DOSE

The size of the dose of analgesic seems to play a minor part in the incidence of narcosis in the infant. In the two groups in which morphine and scopolamine were used the dose for both narcotized and non-narcotized infants was

practically the same. This holds true throughout the study. The five babies that were deeply narcotized received no larger dose than those not narcotized, which leads to the conclusion that the narcotized babies were in all probability more susceptible to the drugs.

TIME INTERVAL

Time	Non-Narcotized No.	Non-Narcotized Per Ct.	Narcotized No.	Narcotized Per Ct.
1 to 2 hours	82	18.5	4	7
2 to 6 hours	264	59.5	43	75.5
6 to 8 hours	97	21.4	10	17.5

The time elapsing between administration of the drug and delivery does not seem to have any direct bearing on the incidence of narcosis in the new born. In the 443 non-narcotized babies, 264, or 59.5 per cent, received the various analgesics between two and six hours before delivery, the time supposed to be most dangerous for the new born. The remaining 179, or 40.5 per cent, received the drug before the second hour and after the sixth hour before delivery. On the other hand, of the fifty-seven babies that were narcotized, forty-three, or 75.4 per cent, received the drug between the second and sixth hour before delivery with the remaining fourteen, or 24.5 per cent, before the second and after the sixth hour before delivery. In our experience we have found that the majority of babies will breathe immediately regardless of the time of the administration. However, where operative procedures are anticipated, we believe that the time factor is one that cannot be disregarded.

AMNESIA OF MOTHER

Amnesia		Narcotized No.	Narcotized Per Ct.	Non-Narcotized No.	Non-Narcotized Per Ct.
Complete	249	30	12.2	219	87.5
Partial	152	22	14.4	130	85.5
None	99	5	5.5	94	94.9
Total	500	57	11.4	443	88.6

There seems to be little direct relationship between amnesia of the mother and the incidence of narcosis of the baby. In the 249 mothers in whom the amnesia was complete 219 babies, or 87.5 per cent, were not narcotized, thirty babies, or 12.2 per cent, were narcotized. In the 152 mothers with whom amnesia was partial, 130 babies, or 85.5 per cent, were not narcotized, and twenty-two babies, or 14.4 per cent, were narcotized. In the ninety-nine mothers in whom there was no amnesia, ninety-four, or 94.9 per cent, were not narcotized, and five babies, or 5.5 per cent, were narcotized. From the above it seems that the effect of the drug on the mother has little or no influence on the welfare of the infant.

SUMMARY

The effect of the various analgesics, namely, morphine, scopolamine, iso-amylethyl barbiturate and gas-oxygen, on the new born is reported.

Five hundred cases were studied. They were divided into four groups.

Group 1 contained one hundred and nine infants the mothers of whom received morphine and scopolamine. Ninety-three, or 85.3 per cent, were not narcotized; sixteen, or 14.6 per cent, were narcotized.

Group 2 included one hundred and sixty-one infants the mothers of whom received morphine, scopolamine and the barbiturate. One hundred and thirty-one, or 81.3 per cent, were not narcotized; thirty, or 18.6 per cent, were narcotized.

Group 3 included one hundred and forty-seven infants the mothers of whom received the barbiturate alone. One hundred and forty-one, or 95.1 per cent, were not narcotized, and six, or 4.8 per cent, were narcotized.

Group 4 included eighty-three infants the mothers of whom had gas oxygen for the termination of the second stage of labor. Seventy-eight, or 93.8 per cent, were not affected; five, or 6.2 per cent, were affected.

The total incidence of narcosis in the entire series was 11.4 per cent.

Traumatism of labor is the most important factor influencing the incidence of narcosis. Twenty-four per cent of the operative group were narcotized. Where operative procedures are anticipated the various analgesics should be used sparingly, as the respiratory center may be further depressed.

The size of the dose of the analgesic plays a minor role in the incidence of narcosis.

The time between the administration of the analgesia and the delivery of the infant does not seem to have any direct bearing on the incidence of narcosis except for those in the operative group.

The effect of the drug on the mother is no indication of its effect on the new born. Gas-oxygen anesthesia used for the termination of labor has little or no effect on the new born.

There were fifteen stillbirths in this series of cases. In no case was death of the infant attributed to the drug.

CONCLUSIONS

This study leads us to the conclusion that the various analgesics administered to the

mother during labor have no serious effect on the new born.

In all groups the respirations were depressed to a slight extent.

The majority of infants breathed spontaneously regardless of the time elapsing between the administration of the analgesic and the delivery of the infant.

The size of the dose and the effect of the drug on the mother have no direct bearing on the incidence of narcosis in the new born.

Traumatism of labor is the most important factor that influences the narcosis and we should like to emphasize that when operative procedures are anticipated all analgesics other than gas-oxygen should be used sparingly and at a sufficient interval before delivery to prevent any further depression of the respiratory tract.

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DISCUSSION (*Abstract*)

Dr. Hugo Ehrenfest, St. Louis, Mo.—The outstanding value of this paper lies in the fact that, unlike many other similar contributions, it does not end with the praise and recommendation of any one of the many drugs employed for pain relief in labor. A considerable number of carefully observed cases are analyzed from various angles to ascertain a possible drug effect on the respiratory center in relation particularly to dosage and time of administration of the various analgesic substances. No striking differences could be ascertained, but the essayist feels that traumatization of the child in birth exaggerates the effect of such drugs.

Obviously a drug administered during labor can affect the respiratory center of the fetus only if it passes in sufficient quantities through the placenta into the fetal circulation. Therefore, the problem logically should be studied chemically to ascertain the presence of the substance in cord blood or in the urine of the new born. Adequate chemical tests and methods at present are not available for some of these drugs and for this reason Dr. Lewis, like other investigators of this problem, was forced to rely on clinical symptoms. He fully realized that the breathing center might not function promptly as the result of either traumatic or chemical impairment. He attempted to differentiate these, but unfortunately clinically this cannot be done with any degree of certainty. Personally I feel that this difficulty and at times impossibility led to his conclusion in regard to a direct influence of traumatization on drug effect. It is just the patient with a long drawn out labor on account of an occipito-posterior rotation or slight cephalo-pelvic disproportion who requires pain relief for protection against exhaustion, and thus I hope that the essayist's warning against analgesic drugs, when an obstetric operative procedure can be anticipated, is not fully justified.

Dr. G. D. Royston, St. Louis, Mo.—I quite agree with the statement of Dr. Ehrenfest that the loss of most babies during delivery is due to birth injuries rather than to any analgesic that may have been used. However, the analgesics used to relieve pain during labor are usually less likely to harm the child than the injudicious use of anesthesia.

For more than a year, my associate, O. S. Krebs, and I have been administering to the majority of our patients during labor six grains of sodium iso-ethylamyl barbiturate by mouth and one c. c. (grains 1/133) of hyoscin hydrobromide intramuscularly as soon as the patient complains of feeling any discomfort. Forty-five minutes after the first dose, a second injection of one c. c. of hyoscin hydrobromide is given. Forty-five minutes after the second dose she is given a third injection of from one-half to one c. c. of hyoscin hydrobromide, depending upon how deeply the patient seems to be under the influence of the sedatives. After this third dose, ordinarily, 0.5 c. c. is given intramuscularly every one and a half hours until she is delivered. This method has given us a smaller percentage of apneic babies than where no analgesic or anesthetic of any kind had been used, and a proper selection of patients will give practically complete amnesia in more than 90 per cent of those to whom it is administered.

Formerly, we used 1/6 grain morphine in place of the barbiturate with the initial injection, this being the method which is still commonly in vogue in the Washington University Clinic in more than fifteen thousand deliveries with a lower infant mortality than among those patients who received no analgesic of any kind. This is all the more remarkable when we realize that practically all of our complicated cases were given hyoscin hydrobromide in combination with morphine or some of the various barbiturates available. The advantage of sodium iso-amylethyl barbiturate combined with hyoscin hydrobromide is that it gives us a wider field in which to administer this combination than when we (Krebs and I) were giving morphine with hyoscin hydrobromide. Opium in any form has a depressant effect upon fetal respiration. Hence, where opium in any form is given, it is recommended that it be withheld if it appears likely that the child will be born in less than four hours following its administration. When the patient is first seen during the second stage of labor, ethylene or nitrous oxide is preferred. Where the fetal head is compressed at the vulval ring for any undue length of time, one commonly sees infants who are slow to begin breathing following expulsion regardless of whether any or no anesthetic or analgesic has been used.

Dr. Lewis (closing).—The primary aim of this paper was to determine what effect these drugs had on the new born from a clinical standpoint. Dr. Ehrenfest is quite right in stating that the problem should be stud-

ied chemically to ascertain the presence of the drugs in the blood and urine. We are at present attempting such a study, but the test for morphine has thus far given us very little help. If some one would be kind enough to give me the ingredients of Wasicky reagent I believe we could approach this problem more intelligently.

In regard to trauma of labor as being the most important factor in influencing the incidence of narcosis, we fully realize that it is difficult to differentiate between narcosis and trauma of labor, but believe it can be done in a fair number of cases. Traumatized infants usually present a very characteristic picture; they are pallid, limp and do not respond to gas resuscitation, while the narcotized babies are cyanotic, move spontaneously and respond readily to gas resuscitation.

In warning against the use of analgesics where operative procedures are anticipated, we want to emphasize the importance of not administering narcotics too close to the termination of labor. It is well known that the maximum effect of the drugs is usually within two to three hours after the administration, therefore if a difficult labor is anticipated, and this is usually determined after an hour or so in the second stage of labor, drugs should be supplanted with gas-oxygen.

I am in complete accord with Dr. Royston in believing that morphine is probably the only analgesic that may affect the baby; but if it is given in the second stage of labor, given early in the first stage and in the proper dosage, it does not affect the baby adversely. I do not repeat the initial dose of morphine, but depend on repeated doses of scopolamine and the barbiturates for the completion of the labor. With this technic one will see very few narcotized babies and all will respond readily to the simple methods of resuscitation.

THE POLIOMYELITIS EPIDEMIC IN NORTH CAROLINA*

By ALDERT S. ROOT, M.D.,
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Heine was one of the first to recognize poliomyelitis as a definite disease entity in 1840 and Medin accurately described the acute stage of the disease in 1889. It was called Heine-Medin disease until the term poliomyelitis (polis: grey) given by Kussmaul was generally accepted.

Three or four outbreaks were recorded before 1885, the first of these comprising 11 cases reported by Colmer, of Louisiana.

As time has passed and the population of the country has increased the disease has become more and more prevalent so that there is no state in the Union which has been entirely free from its visitation. Epidemics of greater or less severity have occurred over the country except in those states south of the Mason-Dixon line. The largest epidemic recorded happened in New York and the New England States in 1916. In New York City alone 9,005 cases were reported. Wisconsin in 1908 had 1,000 cases, and Minnesota 1,100 cases in 1909. In Vermont the disease seems to be endemic. In Southern California in 1934, 3,391 cases were reported.

Poliomyelitis has never been prevalent in North Carolina, the number of cases over a period of ten years averaging 72.8 per year. The largest incidence was in 1929, when 133 cases were reported.

In so far as climate is concerned, the epidemic to be described may be considered further south than any which has occurred in the United States. It is true that the degree of latitude for this State and for Southern California is about the same, but the mean summer temperature in North Carolina is much higher than that of the more equable climate which prevails in the latter State.

Early in the course of the epidemic the State Board of Health acquired the cooperation of the United States Public Health Service, which had representatives upon the scene, and of Dr. W. Lloyd Aycock, representing the Harvard University Poliomyelitis Commission. Dr. LeRoy W. Hubbard, Extension Director of the Warm Springs Foundation, offered cooperation.

Soon after the epidemic started, Dr. Aycock studied the incidence of poliomyelitis in this State during the preceding winter and found that throughout the western section scattered cases of the disease had been reported to the State Board of Health. He felt that the epidemic had already occurred there and that many cases which had been diagnosed as influenza, gastro-intestinal indigestion, acute tonsillitis, and so on, were in reality cases of poliomyelitis, and that as the virus swept eastward the infected cases changed from the non-paralytic to the paralytic type with the advent of summer weather. His prediction that the western part of the State would not be invaded proved to be partly true, because this section had relatively few cases.

The rather sharp line of demarkation shown on the map coincides with the change from cool to hot weather.

The epidemic began with 8 cases in April, originating in Wake County (in which the capital of the State is situated). In May there were 44 cases reported, in June 198, in July 229, in August 81, in September 56, a total of 622 cases.

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*Read in Section on Pediatrics, Southern Medical Association, Twenty-Ninth Annual Meeting, St. Louis, Missouri, November 19-22, 1935.

Distribution of Poliomyelitis in North Carolina.

The peak was reached in the week ending June 29 with 63 cases, the hottest month of the year, thus conforming to most of the other recorded epidemics.

With Wake County as a center the disease spread to the adjoining counties, but the epidemic was largely confined to the east-central part of the State. It traveled northward along the two main north-south highways into Virginia, where it reached epidemic proportions.

The following are some of the epidemiological features of the North Carolina outbreak. There were 622 reported cases. This number does not give a true picture of the extent of the epidemic.

Many physicians who had practiced a life-time had never seen a case before. Hence slight muscle or muscle-group weakness was not easily discerned. Several paralyzed children were reported one, two and three months after the onset, when a slight limp, for instance, which persisted, gave the true diagnosis. There were probably a good many mild cases among the more ignorant class of white people and negroes which were never seen by a physician. Lumbar puncture for diagnosis was not the rule. Hence the mortality rate of 9 per cent on the basis of reported cases was definitely higher than it should have been.

It was our impression from the sick children we personally saw that there were about eight non-paralytic cases to each one paralyzed.

Chart 1* shows the age, incidence, sex and race of those afflicted in the epidemic.

Chart 1

NORTH CAROLINA: CASES OF POLIOMYELITIS HAVING ONSETS JANUARY TO SEPTEMBER, INCLUSIVE

(Reported through October 15, 1935)

Age Group	White			Negro			Indian			Unknown Color			Total			Percentage Distribution
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	
Under 1 year	12	17	29	7	13	20	0	1	1	0	0	0	19	31	50	8
1 to 4 years	118	82	200	27	32	59	2	3	5	1	2	3	148	119	267	43
Total under 5	130	99	229	34	45	79	2	4	6	1	2	3	167	150	317	51
5 to 9 years	87	61	148	10	9	19	0	4	4	0	0	0	97	74	171	27
Total under 10	217	160	377	44	54	98	2	8	10	1	2	3	264	224	488	78
10 to 14 years	24	24	48	3	3	6	1	0	1	0	0	0	28	27	55	9
15 to 19 years	14	13	27	3	3	6	0	1	1	0	0	0	17	17	34	5
20 to 24 years	7	4	11	0	1	1	0	0	0	0	0	0	7	5	12	2
25 to 34 years	6	2	8	1	4	5	1	0	1	0	0	0	8	6	24	2
35 and over	4	4	8	7	1	8	1	0	1	0	0	0	12	5	17	3
Age unknown	1	0	1	0	0	0	0	0	0	1	0	1	2	0	2	*
Total	273	207	480	58	66	124	5	9	14	2	2	4	338	284	622	100

*Under 1.

Chart 2* shows the rate attack per 100,000 for individuals of different ages and indicates the sex of those affected.

Charts 3 and 4* show the attack rate per 100,000 in the white and negro races, respectively.

As is true in most of the reported epidemics, the North Carolina outbreak was more largely rural than urban, the proportion being 65 per cent rural to 35 per cent urban.

A follow-up inquiry was made to ascertain as far as possible the types of poliomyelitis which occurred. One hundred eighty-one of the 622 cases were heard from, and of these 142, or 78.5 per cent, were spinal; 14, or 7.8 per cent, bulbar; 6, or 3.3 per cent, bulbo-spinal; and 19, or 10.4 per cent, were non-paralytic. Of the spinal cases there was 1 death, of the bulbar type 9 died, and of the bulbo-spinal, 2 died. It was the general impression among those physicians who were familiar with poliomyelitis that the epidemic was mild in the degree of paralysis which resulted, and while it is too early to predict with any degree of accuracy, it is probable that over 50 per cent of those paralyzed will completely recover.

Chart 2

NORTH CAROLINA: POLIOMYELITIS, 1935

CASES HAVING ONSETS JANUARY-SEPTEMBER, INCLUSIVE

(Reported through October 15, 1935)

AGE AND SEX DISTRIBUTION OF ALL CASES

Age Group	Population 1930 Census	Total Cases	Rate per 100,000	Population 1930 Census	Male Cases	Rate per 100,000	Population 1930 Census	Female Cases	Rate per 100,000
Under 1 year	74,777	50	66.87	38,046	19	49.94	36,731	31	84.40
1 to 4 years	316,323	267	84.39	160,136	146	92.42	156,237	119	76.17
Total under 5 years	391,150	317	81.04	198,182	167	84.27	192,968	150	77.73
5 to 9 years	427,112	171	40.04	215,216	97	45.07	211,800	74	34.92
Total under 10 years	818,262	488	59 64	413,398	264	63.86	404,864	224	55.33
10 to 14 years	382,298	55	14.39	193,502	28	14.47	188,796	27	14.30
15 to 19 years	360,640	34	9.43	178,610	17	9.52	182,030	17	9.34
20 to 24 years	304,847	12	3.94	144,482	7	4.84	160,365	5	3.12
25 to 34 years	437,092	14	3.20	208,151	8	3.84	228,941	6	2.62
35 and over	865,018	17	1.97	435,983	12	2.75	429,035	5	1.16
Age unknown	2,119	2	.....	1,032	2	.....	1,037	0	.....
Total	3,170,276	622	19.62	1,575,208	338	21.46	1,595,068	284	17.80

Chart 3

NORTH CAROLINA: POLIOMYELITIS, 1935

CASES HAVING ONSETS JANUARY-SEPTEMBER, INCLUSIVE

(Reported through October 15, 1935)

AGE AND SEX DISTRIBUTION AMONG WHITE RACE

Age Group	Population 1930 Census	Total Cases	Rate per 100,000	Population 1930 Census	Male Cases	Rate per 100,000	Population 1930 Census	Female Cases	Rate per 100,000
Under 1 year	52,740	29	54.99	27,004	12	44.44	25,736	17	66.06
2 to 4 years	221,067	200	90.47	112,809	118	104.60	108,258	82	75.74
Under 5 years	273,807	229	84 64	139,813	130	92.98	133,994	99	73.88
5 to 9 years	294,226	148	50.30	149,221	87	58.30	145,005	61	42.07
Under 10 years	568,033	377	66.37	289,034	217	75.08	278,999	160	57.35
10 to 14 years	262,258	48	18.30	133,502	24	17.98	128,756	24	18.64
15 to 19 years	243,507	27	11.09	121,795	14	11.49	121,712	13	10.68
20 to 24 years	208,294	11	5.28	100,136	7	6.99	108,158	4	3.70
25 to 34 years	313,978	8	2.55	151,792	6	3.95	162,186	2	1.23
35 and over	637,703	8	1.25	323,388	4	2.24	314,315	4	1.27
Age unknown	1,175	1	.....	623	1	.....	552	0	.....
Total	2,234,948	480	21.48	1,120,270	273	24.37	1,114,678	207	18.57

Chart 4

NORTH CAROLINA: POLIOMYELITIS, 1935

CASES HAVING ONSETS JANUARY-SEPTEMBER, INCLUSIVE

(Reported through October 15, 1935)

AGE AND SEX DISTRIBUTION AMONG NEGRO RACE

Age Group	Population 1930 Census	Total Cases	Rate per 100,000	Population 1930 Census	Male Cases	Rate per 100,000	Population 1930 Census	Female Cases	Rate per 100,000
Under 1 year	21,518	20	92.95	10,779	7	64.94	10,739	13	121.05
1 to 4 years	93,177	59	63.32	46,261	27	58.36	46,916	32	68.21
Under 5 years	114,695	79	68.88	57,040	34	59.61	57,655	45	78.05
5 to 9 years	130,143	19	14.60	64,644	10	15.47	65,499	9	13.74
Under 10 years	244,838	98	40.03	121,684	44	36.16	123,154	54	43.85
10 to 14 years	117,763	6	5.09	58,815	3	5.10	58,948	3	5.09
15 to 19 years	115,166	6	5.21	55,846	3	5.37	59,320	3	5.06
20 to 24 years	95,004	1	1.05	43,601	0	———	51,403	1	1.95
25 to 34 years	121,227	5	4.12	55,422	1	1.80	65,805	4	6.08
35 and over	223,711	8	3.58	110,677	7	6.32	113,034	1	0.88
Age unknown	938	0	———	455	0	———	483	0	———
Total	918,647	124	13.50	446,500	58	12.99	472,147	66	13.98

JAN.-SEPT., 1935—POLIOMYELITIS CASES AMONG INDIAN RACE—SEX DISTRIBUTION—RATE

Indian total cases	14	Indian male cases	5
Indian total population	16,681	Indian male population	8,438
Rate per 100,000 population	84.00	Indian female cases	9
		Indian female population	8,243

(Cases having onset Jan.-Sept., inclusive, reported through October 15, 1935.)

This prediction is made after conferring with the orthopedic surgeons who are caring for the cases through their convalescence.

It has been suggested that climatic conditions in any specifically infected area might have a bearing upon the morbidity of the disease. The temperature and relative humidity and precipitation recorded in Raleigh, Wake County, during May, June, July and August this year showed little variation from the monthly mean taken for these months over a period of forty years. The average humidity for May was 68, for June 59, July 75, August 69, as against the figures 64, 67, 70, 72, respectively, for the forty-year period. The mean temperature for May was 66.5°, for June 77.5, for July 78.2, for August 77.9 against the figures 68.3, 75.3, 78.3, 77.1° for the forty-year period. The mean precipitation was 3.61 inches in May, 0.90 in June, 5.11 in July and 5.91 in August as compared with 4.1 inches in May, 4.5 in June, 5.32 in July and 5.6 in August for the forty-year record. For the year September 1, 1934, to September 1, 1935, when the epidemic was over, there was an increase in humidity over the forty-year period of 2.4, an increase in temperature of 0.9° and a deficiency of rainfall of 0.12 inches.

Treatment.—Less than 10 per cent of those afflicted received hospital care, the patients having been quarantined in the home by the respective county health officers and attended by the family physician. Hospital facilities were not generally available except in emergency cases, the towns in the State being small and the hospitals, with the exception of Duke University in Durham County, proportionately so. A larger number of cases were among the farmers, where the families are large and where outside help is not often resorted to. It is reasonable to suppose that the quarantine was poorly observed and it is interesting to note that among these families isolated in the country and presumably without contact immunity, there were few contact cases.

There were 12 instances of second cases in the same family. The interval of time between onsets of these cases occurring in the same family was as follows:

3 instances had the onset on the same day
2 had one-day interval between onsets
1 had six days' interval
1 had eight days' interval
1 had a thirteen-day interval.

Funds either from the Government, State or

*Charts, 1, 2, 3 and 4 were compiled by the North Carolina State Board of Health.

counties were not available to combat the epidemic or for any follow-up work, which would have been desirable, particularly in the early stage of the disease.

The policy of the State Board of Health was one of open frankness. It had published daily in the press the number of new cases, the patients' names and addresses, the deaths, if any, and advised continuously such measures as the avoidance of crowds, social parties, going into stores or to moving pictures or Sunday school, against swimming in public pools, against camping, and so on. Realizing that the physicians in the State who would have these cases under their care were generally unfamiliar with the imperative necessity for early orthopedic treatment, the Board of Health mailed to all physicians in the State literature bearing on this subject. This contained a brief description also of simple forms of orthopedic apparatus recommended.

The quarantine period was established for a period of three weeks.

Cooperating with the Board of Health, Dr. A. G. Gilliam, of the United States Public Health Service, administered the Park - Brodie vaccine as a prophylactic agent to 300 children in Greensboro, Guilford County, and Dr. R. H. Onstatt, also of the Public Health Service, vaccinated 93 in Wilmington, New Hanover County. Alternate selected cases were used. Since neither Guilford nor New Hanover Counties were invaded to any extent, these experiments have as their only value the observations upon the antibody content of the bloods taken before and three weeks after the injections of the vaccines. These results will be published at a later date.

A number of local abscesses occurred at the site of the subcutaneous injections. Dr. C. C. Hudson, City Health Officer of Greensboro, who cooperated with Dr. Gilliam, writes that 6 per cent of the 300 children receiving the vaccine developed abscesses at the site of the intradermal inoculation, about 12 per cent developed rather large nodules where the intradermal injection was made and the same number had medium sized hard indurations. A few had constitutional reactions after being vaccinated. Both systemic and local reactions were worse after the second dose. Of the 93 vaccinated in New Hanover County, only one child had an abscess at the point of subcutaneous injection.

It might not be amiss to discuss briefly vaccine preventive therapy for poliomyelitis, a subject of vital interest at this moment.

Since 1910, when Flexner and Lewis[1] immunized monkeys with the killed virus of the disease, investigators have been working upon the problem of vaccine immunization.

Brodie,[2] in January, 1935, and Kolmer,[3] in February, 1935, first applied prophylactic therapy to the human being. Brodie's vaccine is a 10 per cent virus suspension from the spinal cord of an Indian monkey, inactivated with 0.1 per cent formaline.

Kolmer's product is a 4 per cent suspension of spinal cords of monkeys who have developed the disease in a 1 per cent solution of sodium ricineolate.

Both of these investigators reported an increase of antiviral substance after administering their vaccines.

In a more recent article Brodie[4] reported that practically all of the 2,300 children treated with two doses of his vaccine showed antiviral substance in their bloods.

At a round table discussion on poliomyelitis reported in the August, 1935, issue of the *Journal of Pediatrics*, the following were some of the questions raised by Toomey[5] and others:

Is the amount of neutralizing antibodies produced by either of them sufficient to protect the child against disease, the infective dose of which is not known?

Are these vaccines, made from the spinal cords of monkeys, specific for the human being?

Is Kolmer's vaccine really attenuated?

May not attenuated virus become more active after having been injected into the human body?

At the October meeting of the American Public Health Association held in Milwaukee the subject of these two vaccines was discussed. Dr. T. M. Rivers, of the Rockefeller Institute for Medical Research, in a personal communication doubted the complete inactivation of Brodie's vaccine. He feels that the degree of attenuation which would make it safe would also make it uneffective. Kolmer's vaccine he considers unsafe because Dr. Kolmer has not proven the attenuation of the virus in his vaccine. Eight cases of poliomyelitis occurred in individuals after the first and second doses of his vaccine. In a personal letter Dr. Kolmer wrote that 1,200 individuals had been given his vaccine and that he was reasonably certain that several of these eight cases were in the incubation period when the vaccine was given.

Another element of danger which must not be totally disregarded in giving any vaccine which is made from nerve tissue is the fact that it may cause encephalomyelitis. About one in every

3,000 patients who have been given antirabic vaccine develops paralysis.

With the value and safety of poliomyelitis vaccines as yet undetermined, would the wholesale immunization of children in any infected community be justified when one considers the low attack rate in any epidemic? In North Carolina the attack rate was 59.64 cases per 100,000, or about one in 1,666 in children under 10 years of age. Might there not be more danger in vaccinating 1,666 children than in having one paralytic case in that number, with a 50 per cent or greater chance for complete recovery.

The attitude of the twenty-five members of the North Carolina Pediatric Society was one of skepticism, only two of the number having advocated the general use of these vaccines. Most of them either refused to give it, or if they did, would not assume the responsibility for any untoward results which might possibly occur. A good many doses of Kolmer's vaccine, which was available, were given by some of the general practitioners.

Much has been written about the use of convalescent serum, pooled blood or parental blood transfusions both for preventive and curative purposes. Theoretically, they should have some prophylactic value, since more than 90 per cent of adults have an immunity. Practically it seems doubtful that they help to any great extent.

Stokes[6] (*et al*) felt that they obtained favorable results from their use, while Kessel[7] (*et al*) considered them valueless and Schultz and Gebhardt[8] concluded that they were of limited worth. Almost every one agrees that after the first symptom is evident, that is, when the virus has invaded the neurons, neither convalescent serum, pooled blood nor blood transfusions will have any effect upon the extent of the paralysis suffered. The experimental evidence offered by Schultz and Gebhardt[9] points strongly to this. Langdon,[10] Wesselhoeft,[11] Henry and Johnson[12] saw no benefit resulting from their use.

The quantity of convalescent serum, pooled blood or blood transfusions given in the North Carolina epidemic was so small as to be negligible.

Until a report has been made upon blood specimens taken before and after vaccine injections, and the statistics of the disease in the State have been thoroughly analyzed by experts, it is impossible to say whether or not anything of new scientific interest will be learned from the epidemic in North Carolina.

I am indebted to Dr. Carl V. Reynolds, Secretary, and to Dr. Joseph C. Know, Epidemiologist, of the North Carolina Board of Health, for the statistical data and charts bearing on the North Carolina epidemic of poliomyelitis.

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DISCUSSION (*Abstract*)

Dr. W. W. Waddell, Jr., University, Va.—I have listened with special interest to Dr. Root's description of poliomyelitis in North Carolina, since we have had a very similar experience in Virginia. In the clinics at the University of Virginia Hospital we observed during the past summer one hundred and eleven cases of this disease. If the morbidity figures of North Carolina are comparable with those of the Virginia State Health Department, little has been learned concerning the actual incidence of poliomyelitis in North Carolina. I see little value in the statistics which include largely only paralyzed cases, and certainly little protection is afforded the public by quarantine of a few paralyzed individuals if we are to ignore to all intents and purposes a veritable army of non-paralyzed cases.

The following figures illustrate in a striking fashion how one group of fairly well studied cases can alter the figures for the state at large. From April to October of this year there were reported to the Virginia State Health Department six hundred and forty-seven cases of poliomyelitis. A hundred and ninety-one of these cases were reported from Charlottesville, Virginia, and the County of Albemarle. The six hundred and forty-seven state cases questionnaires sent out by our State Health Department were productive of five hundred and twenty-five answers. Of these five hundred and twenty-five, two hundred and seventy-one patients were reported as paralyzed and two hundred and fifty-four as non-paralyzed, a paralysis rate for the State at large of 51 per cent. Included in this group of answers were the hundred and ninety-one cases from Charlottesville and Albemarle County. Of these hundred and ninety-one, only twenty-eight were paralyzed and a hundred and sixty-three non-paralyzed, a paralysis rate for Charlottesville and Albemarle County of 14 per cent. If we exclude the figures from Charlottesville and Albemarle the paralysis rate for remaining sections of the State is 72 per cent. There is a marked discrepancy apparently in these figures because of this fact: few areas of Virginia outside of Charlottesville and Albemarle County reported non-paralyzed cases.

I think much of this discrepancy can be laid directly to the door of the physician. It has been interesting to observe the reaction of the physicians in my own community experiencing for the first time an epidemic

of poliomyelitis. Some refused to admit the presence of any poliomyelitis, others admitted the probability of a few cases of poliomyelitis and a large number of cases of some other disease occurring in epidemic proportions. A third group suspected a new disease, probably of virus origin. The majority of our physicians admit now that we have experienced an epidemic of poliomyelitis with a morbidity out of all proportion to their previous conception of this disease.

I doubt very much that any method of quarantine will control an epidemic of poliomyelitis once it is established in a community, and it would seem highly desirable that we change our ideas concerning quarantine and the reporting of poliomyelitis. Until such changes are made confusion will continue to exist and certainly we will never have the proper conception of morbidity of this disease as long as we think of poliomyelitis purely in terms of paralysis and its other neurological manifestations.

Dr. Theo. C. Hempelmann, St. Louis, Mo.—Dr. Root has given us, in clear and concise language, an excellent picture of the North Carolina outbreak of poliomyelitis last summer. It is evident that we still have much to learn regarding the mode of transmission, methods of control, and adequate treatment of the disease. Probably our problems would be greatly simplified if some test could be devised whereby it would be possible to recognize the carrier and the patient without paralysis. It was disappointing, too, although hardly surprising, to learn that attempts at immunization had not yielded entirely convincing results, and that the procedures used for this purpose must be regarded as still in the experimental stage. Certainly we, as a representative group of pediatricians, have no right to recommend any attempt at mass immunization against a disease until such a procedure has been adequately studied by careful, competent observers and has been demonstrated either by animal inoculation or other suitable means to be without harmful effects on the subject.

At the time of an epidemic there is always a great deal of hysteria among the laity, and it seems to me that public health officials and others could do much to allay public apprehension if they would constantly stress the fact that there are many diseases which have a much higher mortality rate than poliomyelitis, that apparently more patients have the disease without paralysis than with this sequel, and that even when the latter occurs there is still an excellent chance of improvement and often complete recovery.

Proper treatment during the acute phase of the disease is of immense importance in bringing about ultimate recovery. The most important therapeutic measure is prolonged and adequate rest of the paralyzed limb. In cases with extensive paralysis this will usually mean the application of a cast for a period of five or six months, or even longer, the cast being bivalved to permit of passive motion and massage. The purpose of the cast is not alone to prevent foot drop and contractures and to protect the patient during the period of hyperesthesia, but to take all stretch off of muscles and to put the weakened ones at complete rest. With such early care and competent orthopedic services later, practically every case of poliomyelitis can be helped, often to an amazing extent.

Dr. D. Lesesne Smith, Spartanburg, S. C.—The charts which Dr. Root has shown indicate there were 19.1 cases per 100,000 population in North Carolina, which is not a very severe epidemic. The majority of the cases were confined to seven or nine counties situated around Raleigh or Wake County. This area is 250 miles from the mountains of North Carolina and very few scattering cases occurred in this area.

The publicity given by the newspapers to the epidemic was very misleading and very damaging to the mountainous section of North Carolina, which, as I stated, was 250 miles from the infected area. The publicity given created a phobia in the minds of the mothers and children of North Carolina which did far more damage than did the actual disease. The publicity caused an immense financial loss to the camps and summer resorts of western North Carolina. Not a case occurred in these camps. In looking over the past histories of the camps in North Carolina, I find that in the past twenty years there have occurred four cases of poliomyelitis, no two cases in any one camp.

The only two cases that I saw reported as poliomyelitis proved upon examination to be negative; one was pyelitis, the other severe sore throat, but the diagnosis was in the air and popular because of the fear created by the newspapers.

Publicity can do more harm than good under such circumstances.

Dr. G. Foard McGinnes, Richmond, Va.—It has been interesting to compare in my mind certain findings in that epidemic with the outbreak of poliomyelitis in Virginia.

Up to the first of November, 1935, 674 cases, including 37 deaths from poliomyelitis, were reported to the Virginia State Health Department. The disease first appeared in the early part of June in the south-central counties bordering on that area of North Carolina where the disease was widespread. From this section the disease seemed to spread along the routes of travel to almost every section of Virginia. However, it reached epidemic proportions in only a few counties. The outbreak which occurred in the south-central counties of Virginia was very similar to the outbreak in North Carolina as described by Dr. Root. That is, the majority of the cases showed paralysis or definite muscular weakness and more than 70 per cent of these cases were in children under ten years of age. The case fatality rate, however, was somewhat lower. I believe that Dr. Root said that the case fatality rate for North Carolina was 9; in Virginia the case fatality rate was 5.

The increased prevalence in Virginia began in the early part of June and reached a peak during the early part of July. After a slight recession lasting about one week, the disease began to increase again, with the majority of the cases showing no paralysis or muscular weakness. These non-paralytic cases were first reported from the City of Richmond. Later, cases developed in Albemarle and Roanoke Counties and a few other counties of the State.

Coincident to the change in the type of cases reported was the change in age distribution; of these latter cases only about one-half were under ten years of age.

Questionnaires were sent the attending physician for each of the 674 cases reported to the State Department of Health. Answers were received for 525, or 78 per cent, of these cases. If these 525 cases be divided into two groups, paralyzed and non paralyzed cases, the peak of the paralyzed cases was reached about the middle of July, whereas the peak of the non-paralyzed was not reached until three weeks later.

It has been stated here that the number of cases reported to the State Department of Health does not represent the actual number of cases which occurred in the State. This is probably true, because, as in many other diseases, all cases are not seen by physicians, and in a good many other instances the physicians are not sufficiently convinced of the diagnosis to report the case as a specific entity. I do not feel that the physicians should be blamed for this, particularly in poliomyelitis, because I cannot agree with one of the essayists that this disease is easy to diagnose. I have had the opportunity of seeing a great number of cases in several epidemics of poliomyelitis and will have to admit that in many cases it was difficult or impossible for me to make a diagnosis, and I believe that a great many of the practicing physicians feel just as I do regarding the diagnosis of poliomyelitis. It has been interesting to note during this past summer the number of cases in Virginia suspected of being poliomyelitis which have turned out to be other diseases. I think one of the most interesting series which we had was five cases of Rocky Mountain spotted fever (Eastern type) which were diagnosed poliomyelitis prior to the appearance of the rash.

I do not believe that the exact morbidity rate can be determined for very many diseases by our present methods of reporting nor do I believe that they can be accurately computed by any one physician attempting to establish a rate for his particular community or the state as a whole based on the number of cases seen by him in private or hospital practice. Our experience has led us to believe that the only manner in which we can reasonably estimate the morbidity rate of any disease is by a careful house-to-house survey of a significant portion of the population. We have attempted to do just this in certain counties of Virginia during our present outbreak of poliomyelitis. The analysis of this study has not yet been completed.

CASE PRESENTING INTRAOCULAR AND OTHER EVIDENCES OF INCREASED INTRACRANIAL PRESSURE WITHOUT BRAIN TUMOR*

By CLIFFORD L. LAMAR, M.D.
Birmingham, Alabama

This case is the first of four occurring in Birmingham since 1930, showing similar symptoms. The other cases were described to me by those in attendance.

A girl, aged 3 years, was admitted to the Hillman Hospital Pediatric Ward on November 1, 1930, with a diagnosis of fracture of the left femur. As there was overriding of the fragments, the leg was put up in traction, the overhead type of traction being employed. At this time, November 3, the child seemed normal and had no complaints other than the pain in her thigh.

On November 6, or three days after the traction had been applied, the child vomited and during the following four days, or at the end of the first week of overhead traction, the vomiting had become of so much importance that the surgeons requested a pediatric consultation. At this time it was noted that, due to the child's lightness in weight, the traction suspended her body so that only her shoulders and head rested on the bed. The physical examination was negative except for tenderness over the epigastrium, but there was no accompanying muscle spasm. Her temperature never went above 100 3/5 degrees during this period of diagnostic uncertainty nor was there any particular abnormality in the laboratory examinations.

During the next three days, or from November 12 to 15, the child vomited almost everything eaten, and since the x-ray report stated that no barium passed beyond the pylorus, atropine sulphate was given to relieve any spasm that might be present. In addition to the vomiting, which seemed to be somewhat favorably influenced by the atropine, headache began to be a symptom of increasing severity so that an ophthalmologist was consulted for a report on the appearance of the fundi. On November 17 his report was: "Veins in both eyes are enlarged and tortuous. The head of the right nerve clears with two diopters, that of the left with three diopters."

On November 20 a neurological consultation was requested and Dr. W. S. Littlejohn's report was as follows: "There is today a slight fresh hemorrhage in the right disc. There is a tympanitic note on percussion over the occipital region. The child does not cooperate well enough for a satisfactory examination. Impression: neoplasm in the posterior fossa, type and localization to be determined."

November 27 the following note was made: "For the past week the child has seemed increasingly irritable. The vomiting has been variable and the appetite has at times been voracious, but disappeared at the sight of food. She has been lethargic generally, but arouses at times and cries for food. Her speech is defective and her general mentality below normal. She did not retain enough fluids when taken by mouth to maintain her water needs, so that daily hypodermoclyses had to be employed."

On November 29 the child was operated upon by Dr. Littlejohn, whose intention was to do a preliminary ventricular puncture to relieve the increased intracranial pressure and a subsequent air injection for ventriculography. Upon the introduction of the ventricular needle blood was obtained through it, so further operative measures were postponed. It was observed that cerebrospinal fluid escaped under pressure through the needle tract. In order for the child to go to the operating room the leg had to be taken out of the overhead traction and a splint was applied. When she was returned from the operation the traction was not resumed.

On December 4, five days after the operation, Dr. Littlejohn noted that the retinal hemorrhage had disappeared and that the child was symptomatically much improved.

On December 13, two weeks after the removal from traction, the following note was made: "The child has shown a steady improvement since her leg was removed from traction. The vomiting has stopped, the appetite has improved and she no longer complains of headache. The general mental reaction is better, although the child, as Dr. Marriott would say, has low psychological assets."

On December 18-24 the child had a typical attack

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of measles, which was epidemic on the Ward at that time.

On December 30 the eye consultant, who had reported choked discs on November 17, reported that the discs were normal.

On January 20, 1931, the child was discharged by the surgeons as improved without having had a recurrence of the cerebral symptoms.

This child has not been seen by any of the physicians who attended her in the hospital subsequent to her discharge, but we have received reports from the social worker who visits her family. The family is on relief, lives in the country some distance from the city, and all attempts to have her brought in for examination have been unsuccessful. The worker states that the child is doing as well as any of the other children in the family.

SUMMARY

A child of three years, though impaired mentally, was otherwise normal except for a fractured femur. After three days of overhead traction which was employed to reduce the fracture, she developed signs and symptoms of increased intracranial pressure. A tentative diagnosis of brain tumor was made, and she was operated upon to the extent of having a ventricular puncture. Coincident with the operation the overhead traction which had kept her in an abnormal posture was removed. Within three days after the resumption of a normal posture the symptoms began to clear and the signs of increased intracranial pressure had disappeared by the end of four weeks.

The latest report, almost five years after the original observations, is that the child is as normal as her sisters.

This case demonstrates the effect of an abnormal posture on intracranial pressure.

DISCUSSION (*Abstract*)

Dr. Wilmot S. Littlejohn, Birmingham, Ala.—I was called to see this patient because of the neurological symptoms. I have seen one other similar case and know of a third. The case under discussion presented the following neurological findings and final result:

The patient was lying in bed apathetic. The left leg was in overhead traction. The odor of vomitus was noticeable. The patient had been vomiting for several days and looked acutely ill.

The organic neurological examination was essentially negative except for the eye grounds. The optic discs showed marked choking with many hemorrhages in the retinae and overlying parts of the discs. The papilledema was four to five diopters.

As the child did not improve we recommended that diagnostic ventriculograms be done by the method recommended by Frazier and Gardiner. We felt there was probably a posterior fossa neoplasm. The fracture surgeon was requested to put the left leg in a cast so that the patient could be sent to the operating room for ventriculograms, which was done.

Bilateral trephines were done in the occipital region and a brain needle inserted through one. As soon as the needle entered the brain about one cm. there was bleeding around and through it. The needle was withdrawn and the dural slit was enlarged the diameter of the trephine hole. The pia was seen to be markedly congested. Each attempt to reach the ventricle met with similar bleeding. It was considered advisable to postpone further manipulation and the dura was not opened nor was puncture attempted in the other trephine. Ventricular fluid escaped through the cannula tract. The patient was returned to the ward in good condition. Overhead traction was not reapplied. The next day vomiting had stopped.

Neurological examination several days later showed that the choking of the optic disc had receded. The patient continued to improve and when discharged from the hospital January 21, 1931, had apparently recovered from her cerebral symptoms. The retinal hemorrhages had disappeared.

We still considered the patient a case of probable brain tumor, but as she was doing well, decided to delay further investigation.

This was our first patient of this type and we still did not recognize the true condition. Our feeling was that there was a brain tumor, the symptoms of which had been precipitated and aggravated by the suspension.

Subsequent complete recovery without reappearance of symptoms argued against our diagnosis.

While we have not had a report directly from the patient in the past six months, at that time she had shown no recurrence of her cerebral symptoms. It has now been more than five years since she completely recovered from her cerebral involvement.

After six months we came to the conclusion that this patient presented a clinical entity which should be brought to the attention of surgeons handling fractures. Probably anyone dealing with a large number of fractures of the femur, if he uses suspension, will recall cases which might fall into this group. If these symptoms occurred in children the pediatrician was probably called because of suspected acidosis or other constitutional disturbances.

A somewhat similar case of a six-year-old child who developed cerebral complications during treatment by overhead traction was seen in 1933.

Nearly two weeks after suspension of a fractured femur he became suddenly irritable, developed a slight twitching of the right eye, left face, arm and leg, and had difficulty in swallowing water. Within two hours he had a generalized convulsive seizure.

The face was cyanosed. Typical left-sided Jacksonian convulsive seizures were practically constant. The left hand, arm and leg were involved in clonic convulsive movements. The face was pulled toward the left shoulder and the eyes were rotated to the extreme left. The pupils were equal and dilated, being about 3.5 mm. in diameter. They did not react to light.

The optic fundi showed engorged retinal vessels. The discs were clear. The pupils were small, about 2.5 mm. in diameter. They later reacted to light.

Bilateral positive Babinski reactions were elicited. The

deep reflexes in the arms were suppressed. Knee jerks on the right were normally active. The left knee was bandaged and could not be examined. The ankle jerks were normally active. Stimulation by pin prick brought forth a reaction over the entire body, face and extremities, but the patient moved the left hand only slightly, using the right hand to push away the pin even from the left hand, arm and face.

A cast was applied and the leg released from suspension. Two hours later the patient had another convulsive seizure with biting of his tongue.

The day following release of overhead traction, the retinal vessels were normal, the patient talked and moved all extremities equally well, and there were no more seizures. He has now been followed two years since discharge.

These cases are reported to call attention to what is probably an infrequent complication of treating fractured femurs by suspension. They are not presented as an argument against overhead traction treatment when indicated, but in the belief that the surgeon may encounter such complications at times and that they should be recognized. If the suspension had not been discontinued these patients might not have recovered.

It is probable that the suspension caused a cerebral edema by hypostasis due to the abnormal elevation and position of the extremity. This theory is supported by the fact that the patients promptly recovered when the suspension was discontinued and the limbs were treated by application of casts and kept at body level. The treatment recommended is immediate lowering of the limb; in some cases the use of hypertonic intravenous glucose solution may be indicated.

A DISCUSSION OF MENIERE'S SYNDROME IN HEAD INJURIES AND MYXEDEMA*

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I am fully aware of the different opinions in regard to recurrent dizziness, associated with a continuous tinnitus of varying degree, and progressive impairment of hearing. It is of little concern whether or not the patient's symptoms vary to the extent of remissions and attacks. I am interested in the changes from the normal physiology that account for these attacks or for a continuous symptom-complex. Furthermore, it is not consistent with my ideas of the investigative advance in the understanding of the pathology or of the causative factor to dismiss either of these as incomprehensible and to clip the eighth nerve. At the same time, we shall have to appreciate our limitations of understanding.

The profound distress and the frequency of patients presenting a symptom-complex of vertigo, tinnitus, and impaired hearing, has stimulated my interest in these cases and it seems timely to discuss their etiology, pathology, and treatment as seen today. Some of the data used in this discussion are based on experimental, laboratory and clinical work done at Vienna under the supervision of Professor Brunner, at the Polyclinic, Dozent Spiegel at the Marbury Clinic and Dozent Fremel, at the Neuman Clinic, and the teaching of these respective schools of thought.

Why is it that often hearing and equilibrium are involved in the same patient? Is it because the nuclei are close together in the medulla and pons? The superior vestibular nucleus of Bechterew extends as far as the caudal border of the main sensory nucleus of the trigeminal nerve. This is noted because of the frequency of sensory disturbance. The vestibular and cochlear nerves leave the brain together and run side by side nearly to their respective end organs which are in close relation. Thus we may expect, in the end organ and in central involvement, a likelihood of a clinical picture that represents a disturbance in the normal physiology of both the vestibular and cochlear functions. In this paper it will be necessary for me to limit myself, for to cover all of the etiological factors with the secondary pathological explanations would be too inclusive a subject. I shall confine myself to the syndrome occurring in head injuries and myxedematous or hypothyroid states.

I use the descriptive term Meniére, because the essential clinical picture is one of tinnitus, dizziness, impaired hearing and of nystagmus during the exacerbations. Meniére's disease is more essentially a symptom-complex secondary to labyrinth involvement. It was in 1824 that the French physiologist, Flourens, destroyed the labyrinth on one side in rabbits and in pigeons, noting their loss of equilibrium and recording their tendency to roll over and over; they ran almost in spiral fashion.

Charcot, in 1855, attempted to locate the equilibrium center in the brain. One day in 1862 Meniére was riding a bus when a young lady seated in front of him fell in the aisle. She complained of severe dizziness. Meniére took her to the hospital and there made a most careful study to elicit any pathological symptoms, but to his disappointment he found none. The

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patient, however, developed pneumonia and died. A postmortem examination was performed and nothing was found to account for the dizziness. Meniére asked to look in the semi-circular canals, remembering the work of Flourens, and there they found a hemorrhagic endolymph. He then described the disease as one of attacks coming on acutely, manifesting themselves, first, by severe dizziness which necessitates the patient lying down or catching hold of the side of his chair, objects going around and around. The patient breaks out in a cold sweat and often has nausea and headache. There is a vagueness of consciousness, but he is not unconscious. Occasionally there may be such symptoms as pain and sensory disturbances around either side of the face and an aftermath of nervousness and exhaustion which may last for a total of thirty minutes or more. The acute attacks are usually short in duration, but may last minutes or hours. Meniére's description of the attack is perfect as seen today, except for the fact that he left out nystagmus (horizontal and rotary types), which we always have. If the nystagmus is vertical we had better look for involvement of the vestibular apparatus in the medulla, pons or corpora quadrigemina.

In cases that have a tinnitus continuously there is usually associated lateropulsion. It may be so slight as to be noticed only when patients are questioned about the difficulty they have in avoiding objects on one side or the other when walking in narrow spaces, or it may be so severe as to cause them to fall through a shop window. A typical history from my files is as follows:

A patient, 32 years old, engaged in mill work (a strong young man), gave a history of seven or eight attacks in the last five years, all of them of short duration, the longest lasting thirty minutes in its coming and going. In these attacks of dizziness everything went around and around. The last attack before examination came on in the middle of the day. He stated that he had slight constant ringing in his left ear which, during the attack, was markedly exaggerated. Examination showed air conduction impairment of hearing in the left ear.

Recurring attacks that are Meniére in type are seen as the aftermath of head injuries, without any consistency in the time of their appearance, from immediately afterwards to months later. These residual symptoms of head injuries not only interfere with one's well-being, but are the cause of disabilities that disturb the patient's economical adjustment. This, in turn, frequently makes it necessary for the physician to testify as to whether the patient is malingering or has an organic head condition. What is the prognosis and a fair adjustment of compensation in cases that have disability?

The head injuries that we shall consider are the common injuries one sees daily. I shall divide them as follows: first, concussion of the brain with ear symptoms and, second, concussion of the brain with concussion of the inner ear. In this division a concussion of the brain can exist without concussion of the inner ear, but a concussion of the inner ear cannot exist without concussion of the brain.

At this point, let us consider for clarity, what is a concussion of the brain? When one has a blow on the head, the bones of the skull are compressed. The bones are elastic to a certain degree and do not always fracture. If such an injury compresses the skull, then we get an acute increase in the intracranial pressure. A concussion of the brain does not exist; it is a compression of the brain. The brain substance, blood vessels and cerebrospinal fluid are compressed. The ganglion and glial cells will be pushed against each other. Ricker says:

"If we have a head injury, there is produced within the skull a so-called praestatic blood circulation. This is functionally characterized by the fact that the blood runs slowly in the enlarged blood vessels. Anatomically the praestatic blood circulation is characterized by the fact that lymphocytes and other exudate leave the large vessels. The praestatic blood circulation that we get after injuries is very often a permanent condition; sometimes it remains throughout one's life."

It is difficult to demonstrate the pathology, because, if the patient dies at once, the tissue changes are not demonstrable, and later you may not get an opportunity to see it. It is estimated that after a brain compression pathological changes appear in twenty-four hours. They may be localized in the various places of the brain and are particularly likely in the thalamus, corpora quadrigemina, and very often in the vestibular and cochlear nuclei.

If the brain is compressed, then the lateral ventricles are also compressed. The cerebrospinal fluid goes through the foramen of Monro into the third ventricle, from the third ventricle through the aqueduct of Sylvius into the fourth ventricle. Below the floor of the fourth ventricle lie the vestibular and cochlear nuclei and this gives us the idea that the vestibular and cochlear nuclei are likely to be damaged.

Therefore, when a concussion of the brain occurs, there is a revolution of physiologic function secondary to the changes within the skull. Our knowledge of the pathology is based mainly on concussions produced in laboratory animals.

Every concussion of the brain causes changes in the brain that may be demonstrated and seen histologically if the patient comes to autopsy. If such changes occur, and 42 per cent involve the vestibular and cochlear nuclei in Brunner's studies, then clinically there is a definite organic condition. This has been named "concussion of the brain with ear symptoms." These are characterized by the fact that we find nothing in the ear, but changes of a degenerative type are localized in the vestibular and cochlear nuclei.

The ear symptoms that are elicited in 42 per cent of the concussions of the brain are, first, dizziness which is not very intense, in fact, always slight, appearing in attacks. It is seen at times when the patient is excited or has taken alcohol, but not often. If such a patient has had continual dizziness, then very probably he is a malingerer, or he has more than a concussion of the brain. Second, nystagmus; this is similar to the dizziness in its degree. Third, falling reaction which is also slight. Fourth, tinnitus; this, as a rule, is absent. The cochlear test, the tuning fork test and bone conduction are normal. (We were taught that the bone conduction is reduced, but experience does not agree with this.)

The prognosis in regard to dizziness from head injury is guarded. In the majority of cases this symptom continues or becomes worse. The head movement test and the caloric test are employed to determine whether the patient truly has a dizziness. A positive reaction after the head movement test eliminates malingering or hysteria. Labyrinth hyperactivity also suggests true dizziness. The patient at times may have a nystagmus.

The question as to the disability of these individuals or the percentage of their disability is one of our problems. First, a man with dizziness cannot work as he did before. Second, the prognosis is not too good; we cannot definitely promise these persons a cure, as treatment has not been of great value in these cases. An estimate for compensation for insurance companies and court adjustments in suits will vary, of course, with the individual and his occupation, but a 40 to 60 per cent disability seems fair when taking into consideration the above facts.

Concussions of the brain with concussions of the inner ear present a more remediable condition than the former. I have said that if an injury involves the skull the brain will be compressed; the blood circulation becomes a praestatic, or retarded circulation.* The flow of the cerebrospinal fluid and the increased pressure does not of itself affect the inner ear, but the blood circulation does. There is a direct relationship between the brain circulation and the circulation of the inner ear. The chief artery (internal auditory) to the middle ear comes from the brain, as a branch of the posterior inferior cerebellar artery. If we have a slow circulation of the blood in the brain, then perhaps we have the same type of circulation in the inner ear. In the laboratory we can produce a concussion of the brain in animals. The petrous bone is then examined microscopically. If we can demonstrate in the perivascular and perilymph spaces of the inner ear, lymphocytes and exudate, and at the same time show that the middle ear and the meninges are free of infection, this is evidence of praestatic circulation, during life, of the inner ear. This entity has been named "vasomotor internal otitis," because it is an internal otitis produced by vasomotor troubles, not by infection. This otitis vasomotorium is fairly common. There are several conditions which may produce vasomotor disturbance within the skull; head injuries, toxic states from lead and carbon monoxide poisonings, climacterium and syphilis.

The diagnosis of concussion of the inner ear is made if the following symptoms are elicited: first, tinnitus, which is absent as a rule. Second, hearing is diminished, usually unilaterally; if the diminution is bilateral, it is always more on one side than the other. This deafness is the important finding. Third, labyrinthine irritability after the caloric test is either normal, less than normal or absent. The tuning fork test is usually normal (normal when caloric test is absent). The fourth symptom is dizziness; this occurs in attacks which are slight. Fifth, sudden head movements are seldom positive. Sixth, past pointing and nystagmus are both found in concussion of the brain and of the middle ear.

The prognosis is not good concerning dizziness, because the patient has a concussion of the brain. It is guarded, but better, concerning deafness. The disability is not estimated much higher in concussion of the inner ear than in the case with only concussion of the brain (perhaps 10 per cent), because the marked deafness on one side

*The term "praestatic circulation" is used to denote the slowing of the velocity of the blood stream that is secondary to vascular dilatation. The same volume of blood will go through the dilated vessel very much more slowly than through a normal vessel, and this retarded circulation accounts for the perivascular infiltration.

does not disturb the patient very much. Furthermore, we have a treatment for these cases of deafness that is of value.

The treatment for vasomotor otitis interna is a combined iodine, calcium and atropine therapy. This regimen is effective in diminishing the tinnitus. The iodine and calcium may be given intravenously on alternate days and the atropine daily orally.

In the clinic we give a prescription for sodium iodide, eight grams in water, q.s. 200 c.c., directing the patient to take a teaspoonful three times a day. Incidentally, this same prescription may be used in the dizziness and tinnitus of menopause. The dizziness usually disappears after menopause, but tinnitus sometimes continues and the above treatment gives relief. Charcot suggested giving quinine. Of course, this causes eighth nerve degeneration and is not considered advisable.

In the acute stage of head injury with concussion, we have given the patient 25-30 c.c. of his own whole blood intramuscularly, repeating every four or five days for a series of six to eight treatments. The number of cases treated is too few to draw any conclusion, but we feel justified in the continuation of this procedure. Lumbar punctures and hypertonic solutions intravenously are cautiously used to keep down the intracranial pressure. When there is evidence of a localized clot, surgery is considered.

There may be many residual symptoms of head injury. These Meniére syndromes may not be the only kind of attack. We see attacks which simulate true epilepsy, and it is interesting to note that sometimes these attacks do not occur for several months, or even longer. In one of our cases the first attack appeared two years and three months after the initial head injury. This same individual had a very definite involvement of his cochlear and vestibular nuclei.

Now in reference to the pseudo Meniére syndrome seen in hypothyroid states, the intensity of the symptoms and attacks depends on the degree of actual myxedema and not on the basal metabolic rate. In spite of the rarity of these cases, I believe it is worth while to give some thought to them. Of late I have seen several cases that have gone from clinic to clinic without the causative factor of their presenting symptoms being found or recognized.

The myxedematous swelling may affect the skin of the entire body, although it shows a predilection for the cheeks, lids, nose, supraclavicular fossa, neck, back of the hands and dorsum of the feet. This swelling is not limited to the skin but also invades the mucous membranes. The thickened mucosa of the larynx leads to alterations of the voice which become harsh, singing being impossible. The eustachian tube and tympanic cavity are also involved by swelling, causing dizziness, tinnitus and a diminution in hearing ability. There is a narrowing of the eustachian tube interfering with the conduction of sound from the drum and the freedom of inner ear movements. Histological examination of this swollen tissue shows alterations of the muscle fibers and increase in connective tissue, the latter showing numerous nuclei and numerous newly formed capillary vessels.

Retardation and sluggishness are, of course, characteristic of myxedema. A diminution in response to stimuli is quite apparent in the psychic and motor functions of the hypothyroid individual. The entire nervous system is less responsive to normal stimuli. Clinical observations, as well as laboratory experiments on thyroidless animals, done by Cyon and others, confirm the above statements. Cyon reported that in such animals he found diminution in reaction time of individual nerves. Barlow, by using the Barany test in myxedema, has shown that in this disease there is a definite clinical vestibular picture which may be demonstrated by a delay in response to stimuli. He further states that the degree of this response does not bear a relationship to the basal metabolic rate.

If we have increased thickening of the mucosa of the inner ear and a delay in response to vestibular stimuli, and these facts are demonstrable, then it seems reasonable to assume this as an explanation of the clinical picture as presented by a percentage of the hypothyroid patients. These patients usually give a definite history of their conditions being progressive. Furthermore, it has been observed in our practice that the therapeutic test is most gratifying and impressive. It has been my experience that the voice shows the first change toward normalcy, then the vertigo diminishes, the tinnitus gradually disappears and hearing begins to return but is the slowest of them all. Patients who have swelling of the face and facial pain, and a good many of them do,

are made more comfortable when thyroid medication is sufficient to take care of the body thyroid needs. Swelling of the face is gradual in its improvement. It is here that I would like to note an observation, namely, that in cold weather thyroid medication has to be increased, while in warm weather it has to be decreased to maintain an approximately normal metabolic rate in these marked hypothyroid people. One of my patients, who in the winter had been improving and had become quite comfortable on a dosage of eight grains a day, after the first few warm days manifested symptoms of excessive thyroid medication. In warm weather her thyroid requirements were definitely less.

Another hypothyroid case, a physician in a rural community, in addition to his dizziness, tinnitus and slightly impaired hearing, had a rather severe facial neuralgia. He noted in the winter when he was in and out of his car that the amount of thyroid he had started to take in the summer, which at that time was sufficient to keep him comfortable, was not at all adequate. He told me that on really cold days he took two or three times the amount of thyroid that he required in the summer to keep comfortable.

In conclusion, there are a few important points that I think should be kept in mind: First, every case of head injury, though apparently slight, may be serious, and, second, the aftermaths respond limitedly and slowly to therapeutic procedures; thus, it seems advisable to exert our efforts both at the time of the injury and afterwards. Compensation brings in the element of possible malingering which we should be able to eliminate.

Hypothyroid states also frequently account for symptoms that send the patient to the throat and ear specialist. It is advisable in cases in which there are general hypothyroid characteristics without physical abnormalities of the ear, nose and throat to account for facial pain, hoarseness, vertigo, tinnitus, and deafness, that a definite check of the thyroid activity be made.

DISCUSSION (*Abstract*)

Dr. W. W. Young, Atlanta, Ga.—Such a sound and conservative attitude as Dr. Shield takes in this paper is extremely refreshing. It is probably best that in a great many cases we do not rush direct into surgical procedures without efforts directed along other lines.

RECENT ADVANCES IN THE DIAGNOSIS AND TREATMENT OF ALLERGIC DISEASE*

WITH SPECIAL REFERENCE TO GLUCOSE TOLERANCE AND METABOLISM

By HARRY B. WILMER, M.D.,
MERLE M. MILLER, M.D.,
and
JOSEPH T. BEARDWOOD, M.D.,
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In the past decade the technic in the diagnosis of allergic disease has been highly refined and rendered extraordinarily efficient, but therapy has lagged in the doldrums of ignorance of the underlying, fundamental etiologic factor. We are quite aware of the pathologic picture of an allergic reaction, vascular relaxation culminating in peripheral edema. We know that, by and large, the majority of allergic individuals have an hereditary background of allergy. We can determine and demonstrate the precipitating agent or atopen causing an allergic reaction, but the basic or primary elemental imbalance has really never been discovered.

The autonomic nervous system has received a great deal of consideration. Hepatic and gastrointestinal function and metabolism have been studied. Acid-base equilibrium has been designated as a factor. Blood chemistry determinations with particular reference to calcium and phosphorus content were thought to be essential. Hematologic studies, especially the finding of an eosinophilia, were at one time thought to be of paramount significance. Careful observation has been made of each of the ductless glands in succession. Dysfunction of any of these *per se* or any polyglandular derangement apparently does not seem to have any primary bearing on the allergic state, but there does seem to be some background for the feeling that a synergistic or antagonistic action of some of the members of the endocrine system seems to play a part in the production of allergic disease.

Blood sugar observations in hypersensitive individuals were first presented in 1924 and reports of carbohydrate tolerance and metabolism in allergic individuals reached the literature as late as 1933. Black at that time reported a se-

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ries of 100 allergic cases in which blood sugar determinations had been made. The majority had a fasting blood sugar of 70 to 90 mg. per cent. He, an allergic individual, did a blood sugar tolerance on himself (using 115 grams of dextrose, or 1.75 grams per kilo body weight) with the following result: fasting sugar was 67 mg., at the end of half an hour 114 mg., and in two hours 80 mg. Sugar tolerance tests were done on 12 other allergic persons with corresponding results. This is the first report we can find of a glucose tolerance test on a patient with allergic manifestations. As Black had observed in himself a marked sugar hunger during an attack of hay fever, we also have noted several times in our patients a craving for sugar during a prolonged siege of pollen irritation. One of them stated that he could eat as much as a pound of candy after dinner without any untoward effects and with some therapeutic benefit.

With these reports in mind and being markedly stimulated by the recent outstanding work of Long on carbohydrate metabolism, we have humbly started our investigation into its role in allergy and we wish to make a preliminary report of our findings.

Injections of epinephrine produce hyperglycemia and of course we know that parenteral insulin decreases the glucose in the blood. Long, Lukens and Evans have perfected a technic by which they can remove both the adrenals and the pancreas in cats and these animals have been found to live in fairly good health for as long as 28 days and have eventually died of hypoglycemia, while cats depancreatinized only have rapidly died of hyperglycemia.

This group of investigators has also shown that it is not the adrenal medulla that brings about this phenomenon, but the cortex, as animals in which the medulla only has been removed rapidly die of diabetes after pancreatectomy. Just as Long believes that diabetes mellitus may be due to the "uncontrolled activity of other endocrine glands," we feel that possibly allergic disease may be due to the unrestrained function of one or a group of glands. Allergic individuals often manifest all the evidences of a hypo-adrenia: low blood pressure, asthenia, hypoglycemia, soft small pulse and vasomotor instability; but, with all this, there is no definite evidence that the adrenal gland alone is at fault. If the allergic state is not a true hypoadrenalism, then there may be some interrelationship of endocrine hormones in accord or opposition that brings about the condition known as allergy.

We quote the above only because we believe that there is some disturbance of carbohydrate metabolism in persons who have allergic manifestations. If it is not an altered carbohydrate metabolism alone, it may be the end result of a glandular dysfunction that accompanies or is the background of allergic disease.

In this connection it is of interest to note that in a group of 4,762 allergic cases in our records we have discovered only two who have had diabetes or diabetic symptoms. Both of these were "bacterial asthmatics" with no definite evidence of a hypersensitivity to foods, pollens or epidermals. One case did not show any evidence of diabetes until she had been placed on moderately large doses of epinephrine at close intervals. In this patient, the blood sugar was raised from 100 mg. per cent to 310 mg. per cent in 48 hours. Her hyperglycemia persisted until insulin therapy was instituted. As soon as epinephrine was used again, her blood sugar was elevated and persisted at this level. This problem was controlled by diet and insulin, but it was impossible to give the patient epinephrine to control her asthmatic seizures. It has been shown that diabetes cannot be precipitated in experimental animals by the use of epinephrine, but we think it well to bring this case to your attention, as we believe that this patient was definitely thrown into diabetes by the injections she received.

In a group of 1,870 diabetic patients we have found only 2 who have been definitely proven allergic. One patient had seasonal hay fever and the other was an asthmatic with a sensitivity to insulin. Only occasional injections of epinephrine were given to the patient with asthma for fear of raising the blood sugar to the point of danger. Isolated doses of epinephrine do not seem to produce any symptoms of hyperglycemia, but it may be well to have blood sugar determinations at regular intervals in patients who are taking moderate or large doses of epinephrine.

As we feel that the ability of an allergic patient to handle carbohydrates is best determined by the sugar tolerance test, this procedure has been done on 100 allergic cases in our practice. Sixty of these were in the class designated as extrinsic cases, that is, hereditarily allergic and primarily sensitive to some substance in his environment. Twenty-eight of this group were uncomplicated hay fever cases and the remainder had one or more other allergic symptoms.

Sixteen patients were classified as intrinsic cases. It may be pointed out that an intrinsic asthmatic is one in whom there is no demonstrable sensitivity, but there is present some process or arrangement within that is producing the allergic symptoms. This can be a mechanical defect, focus of infection or a toxic or nervous mechanism that is producing the syndrome known as allergy.

We also show here the glucose tolerance curve in three patients before and after epinephrine and glucose therapy. The results are quite marked with reference to the type of curve and only slightly less as to therapeutic results.

The Exton test was done on three extrinsic and on three intrinsic allergic individuals. The results corresponded to those obtained in the usual three-hour sugar tolerance test. The technic of the Exton test is as follows:

A fasting blood sugar is taken, after which the patient is given 50 grams of glucose. Thirty minutes after ingestion of glucose, a second specimen of blood is collected and a second dose of 50 grams of glucose given. Thirty minutes after the second dose of glucose, a third sample of blood is taken. The typical criteria of normal responses to the test are:

(1) Fasting blood sugar that is within the normal limits of the particular blood sugar method employed.

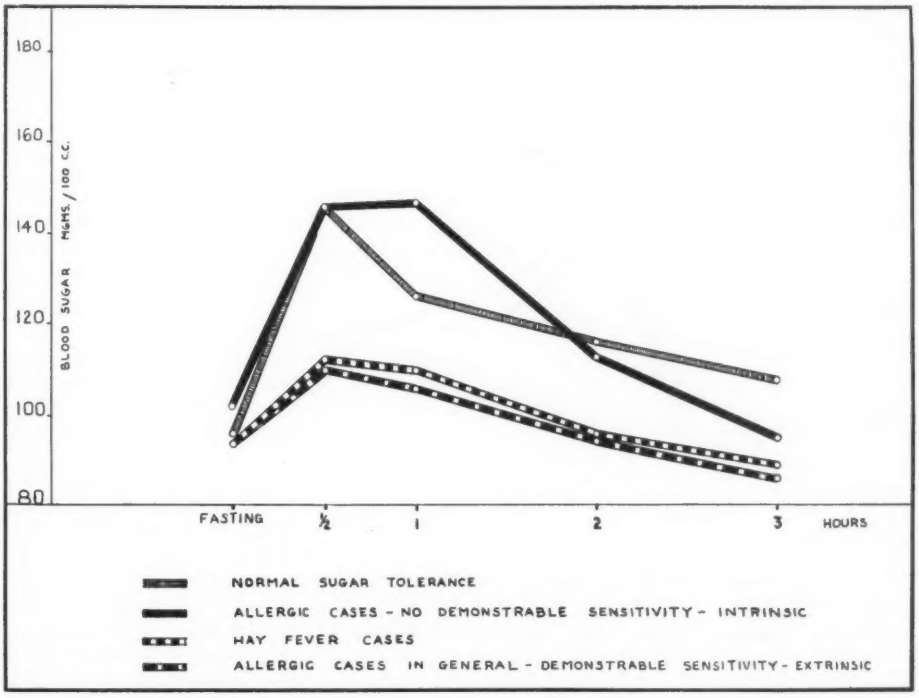
(2) Thirty-minute sample: a rise in blood sugar which does not exceed 75 mg.

(3) Sixty-minute sample: the blood sugar is less, the same, or does not exceed the thirty-minute sample by more than 5 mg.

The standard for determining diabetes in the one-hour two-dose test is a more or less steep rise of not less than 10 mg. of blood sugar in the sixty-minute sample following the second dose of glucose. In the extrinsic typically allergic individuals, the sixty-minute determination averaged 15 to 25 mg. below the thirty-minute readings.

In the three-hour sugar tolerance test, each patient was given 1.5 grams of dextrose per kilogram of body weight. Blood sugar estimations were taken at the end of one-half hour, one hour, two hours and three hours. No glycosuria was noted in any of our determinations. Account was taken of allergic symptoms at the time the glucose tolerance estimation was done. There was found little or no variation dependent upon symptomatology, but all of our cases may be said to have been in the allergic state at the time the test was done, that is, capable of manifesting symptoms of hypersensitivity on any provocation by a specific atopen.

A composite diagram of all cases is shown and a curve of each type individually plotted. These graphically show the marked difference



Graph 1

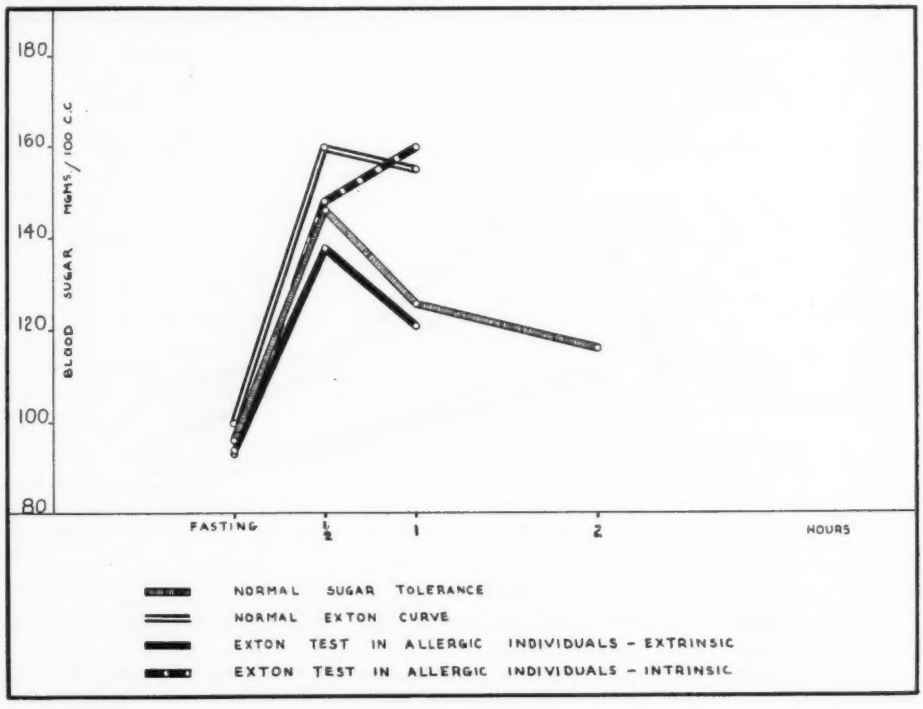
in carbohydrate tolerance between the normal and the allergic individual, no matter what type the latter may be (*Graphs 1, 2* and *3*).

Several reports have appeared in the literature showing the benefit derived from the use of glucose in the treatment of asthma. Knott, Oriel and Witts found the administration of glucose of value in asthmatic children, but stated that the effect diminished rapidly with age. Matzger reported a series of cases treated by intravenous glucose with excellent results. This type of therapy has also been tried by other workers with varying success.

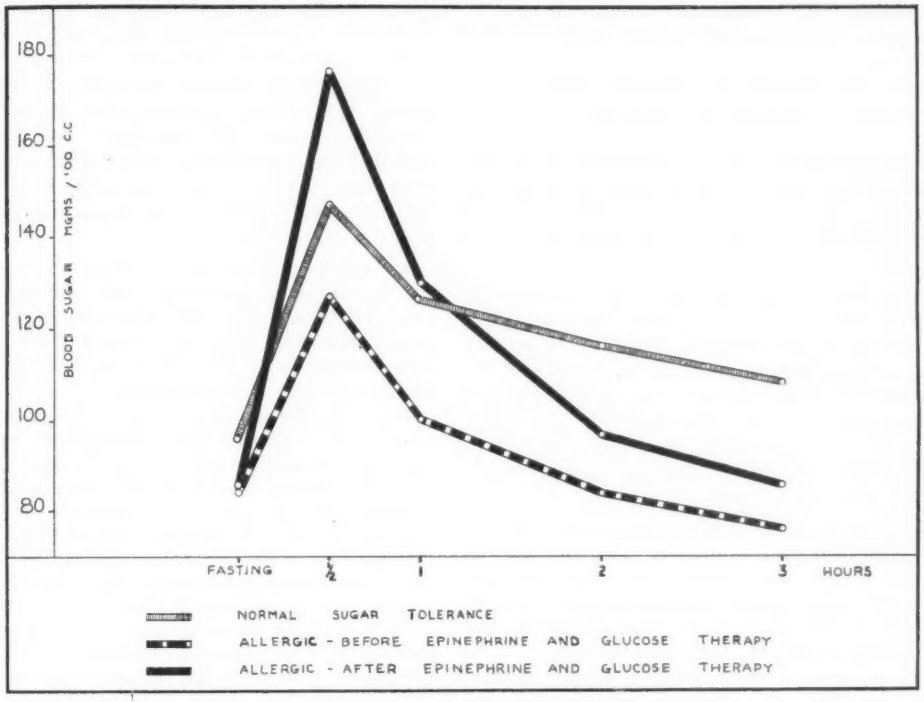
We have used dextrose by mouth and glucose intravenously in the treatment of some of our cases of bronchial asthma. On occasions we believe it has been of benefit, perhaps largely due to its nutritional value in building up the depleted liver glycogen reserve, especially in patients taking epinephrine. In two of the diagrams we have shown the effect on sugar tolerance of the use of epinephrine and glucose together. We think this method is more acceptable and of more therapeutic value than the use of either one alone.

Epinephrine over a long period exhausts the glycogen in the liver and, in time, depletes the muscle glycogen. This mechanism is diminished by the careful administration of glucose by mouth or intravenously. It has been our custom to give 100 to 150 grams of dextrose by mouth daily or 50 c. c. of 50 per cent glucose intravenously once or twice daily as necessary. The epinephrine was given in doses of 5 to 10 minims of a 1:1000 solution, three to four times daily, whether the patient had an asthmatic paroxysm or was relatively free due to usual remissions.

Treatment of asthma or any other allergic disease by glucose alone is of questionable value, but it is of benefit and a valuable adjunct to therapy in any form of allergy where there is found a low blood sugar and a high sugar tolerance. Maximum results are obtained in using the combination of epinephrine and glucose by whatever schedule is indicated by the condition of the patient.



Graph 2



Graph 3

CONCLUSIONS

(1) The true etiologic background of allergic disease has never been discovered.

(2) Investigation of all systems and mechanisms of the body has thrown no light on the primary cause of allergic manifestations.

(3) In the opposing action or synergistic functional activity of any one or group of glands may be found the answer to the etiology of allergy. We hope that future investigation may reveal the exact mechanism.

(4) The ability of an allergic individual to handle glucose as demonstrated by the three-hour sugar tolerance determination is not exactly pathognomonic of allergic disease, but it is a valuable adjunct in diagnosis.

(5) The glucose tolerance curve in allergic individuals is graphically shown and a marked difference between the determinations in this group and in the normal group is noted.

(6) Carbohydrate tolerance and metabolism are altered in the allergic state.

(7) The treatment of asthma and other allergic symptoms by glucose alone is not of marked definite therapeutic significance, but the combined use of epinephrine and glucose has been of benefit in some refractory cases.

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THE RELATION OF ALLERGY TO GASTRO-ENTEROLOGY*

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In a previous study I tabulated a hundred consecutive cases of allergy seen in my private practice limited to allergy. Before beginning the present study another hundred cases were added.

In these two hundred cases the following allergic syndromes were found: asthma in 116 cases, or 58 per cent; hay fever† in 99, or 49.5 per cent; urticaria† in 31 or 15.5 per cent; eczema† in 21, or 10.5 per cent; gastro-intestinal upsets in 19, or 9.5 per cent; migraine† in 7, acne in 4, conjunctivitis in 4, polyarthritis and stomatitis in 1 each. Dividing the last figures by 2 gives the percentage figures.

In about 50 per cent of these cases only one allergic syndrome could be elicited. In the other 50 per cent two or more syndromes were found concurrently as asthma, hay fever and eczema or hay fever, gastro-intestinal upsets and urticaria or various other combinations.

It is seen that in the above tabulation of these two hundred cases 9.5 per cent, or approximately one in every ten, suffered from gastro-intestinal upsets. Nineteen of the two hundred were thus affected. Only one of the nineteen suffered from stomach trouble alone. Ten of them had also hay fever, five had asthma, four had urticaria, three had eczema, two had migraine. These various syndromes occurred in various combinations in the eighteen cases.

The age range in these nineteen cases with gastro-intestinal upsets was from 1 to 67 years. There was one infant of 1 year, two small children each 3 years old, one boy of 9 years. There were thirteen cases in the age range from 24 years to 50 years. One woman was 55 and one man 67 years old.

The gastro-intestinal symptoms in this group ran the gamut of the various forms of stomach trouble. In the cases of the infant and young children there were nausea and vomiting with distention of the abdomen, usually accompanied by constipation.

In the adult cases the symptoms were of various types. There was distention with various grades of discomfort after eating. One case had the typical hunger pains of ulcer, relieved by alkalies. Several had discomfort after eating, followed by nausea and vomiting. One woman said that she had vomited after eating at times since early childhood and that for the past year she had vomited after at least one meal each day.

In several cases the history was that the vomitus had formerly tasted sour, but more recently had had a bitter taste. In these cases the heartburn which had formerly been the chief symptom had changed to gaseous distention and discomfort in the abdomen after eating.

In a number of cases spells of acute colicky pain in the abdomen were interspersed among the other complaints and most of the adults who gave this history had had intra-abdominal operations. Of this group of nineteen cases, ten had had a total of eighteen different intra-abdominal operations. Of these eighteen different operations, probably not more than three or four would have been done had the allergic nature of the condition been realized. The abdominal discomfort and pains had continued after the operations just about as before. One or two, however, admitted some degree of benefit following the operations.

The operations in this group as reported by the patients, and in several cases confirmed by communications from the surgeons, were as follows: there were seven simple appendectomies, one appendectomy with gallbladder drainage (and in this case stones were found in the gallbladder), one appendectomy with removal of uterus and tubes, and one laparotomy in which an ovary was removed.

One of the simple appendectomies was done on a patient who was opened up with the intention of doing a pyloroplasty, but the pylorus was found to appear normal and a normal appendix was removed and nothing else done. Another of the simple appendectomies was followed a year later by pyloroplasty. One was followed five years later by uterine suspension. One of the appendectomies was followed four years later by inguinal herniotomy, and four years after that by repetition of the same.

One of these cases had five operations in twenty-one years as follows: appendectomy followed five years later by herniotomy, eleven years later by gastro-enterostomy, three years later by gallbladder drainage, and two years

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†Hay fever includes all forms of allergic rhinitis; urticaria includes angioneurotic edema; eczema includes all forms of allergic dermatitis; and migraine includes all forms of allergic headache.

after that intestinal obstruction. This patient had hay fever and had two sisters and two brothers all with hay fever or asthma.

Of these eighteen operations, the two inguinal herniotomies, the panhysterectomy and the uterine suspension were done for conditions independent of the allergy, but few of the others would have been performed, I believe, had the true nature of the condition been realized.

Mucous colitis has been described as a frequent accompaniment of gastro-intestinal allergy. It was present in only one of these cases and that was the patient who had had five operations. Constipation was the rule in this series of cases instead of diarrhea, but several had no trouble either way. In all these cases the one characteristic thing about the condition was the long-continued chronicity.

The physical findings in the abdomen in this group of cases when seen by me were practically negligible. I saw most of them in intervals between acute attacks and the only findings were slight degrees of tenderness at various points in the abdomen and some gaseous distention.

The diagnoses in the unoperated group, when they came to me, were "stomach trouble," pylorospasm and gastric or duodenal ulcer, all possibly correct, with allergy as the underlying cause. In the operated group the preoperative diagnoses were appendicitis, ulcer of stomach or duodenum, pylorospasm and exploratory laparotomy.

Much of the diagnosis of allergy and the greater part of the treatment is based on the results of skin tests to a large variety of allergens. I believe that allergy now furnishes a scientific guide to much of the dietetic treatment of chronic stomach complaints. Every case suspected of being allergic should have thorough and careful study with all varieties of allergens. This means intradermal testing with from one hundred and twenty to a hundred and fifty or more separate tests, depending on the patient and the type of case.

Experience has taught us that foods are the allergens most often involved in causing stomach disorders. Nevertheless, these cases should have the complete study as well as all other types of allergy. We all know that there are many patients with pollen hay fever who get the best results only after foods and other allergic sensitivities are treated concurrently with the pollens. Likewise there are many patients with gastro-intestinal allergy who will be benefited only after treatment of all their sensitivities together and will not be relieved by diet alone.

In the two hundred cases comprising this whole study 8 per cent reacted to foods alone. However, only one of these was among the nineteen gastro-intestinal cases. Eighteen of the nineteen stomach cases each reacted to two or more allergens other than foods.

For purposes of convenience allergens are divided into pollens, miscellaneous inhalants, foods and contactants. Each group has numerous subheadings and some allergens as cottonseed belong in two or more groups. The contactants are of use in various forms of dermatitis only and will not be considered here.

I have tabulated the allergens which reacted in the first one hundred unselected cases and those which reacted in the smaller selected group of nineteen gastro-intestinal cases. Comparison of the two groups shows very little variation. There may be a slight tendency for the inhalants to react more in the unselected group and the foods to react more in the gastro-intestinal cases. However, the slight differences shown could easily be explained by the small number comprising the study.

Of the one hundred miscellaneous allergy cases 47 per cent reacted to one or more pollens, while of the nineteen gastro-intestinal cases only 37 per cent reacted to pollens. Of the one hundred, 74 per cent reacted to house dust, but of the nineteen stomach cases only 58 per cent so reacted. Tobacco reacted in 66 per cent of the hundred, but in only 47 per cent of the nineteen. One or more animal hairs and one or more feathers reacted in about 50 per cent both ways. Cottonseed reacted in about 30 per cent of both groups. Orris root reacted in 6 per cent of the larger group, but in 15 per cent of the nineteen gastro-intestinal cases.

The big surprise of the day is in regard to the food reactors. Milk is the most common reactor of all the allergens in my experience. Lactalbumin or casein, one, or, more frequently both, reacted in 93 per cent of the hundred unselected cases and in 95 per cent of the gastro-intestinal series. This is cow's milk. I have not tested goat's milk with as much regularity as cow's milk because, in my experience, both have usually reacted when either one did so.

After milk the next most common reactors were the cereal grains, one or more of which reacted in 71 per cent of the hundred and in 79 per cent of the gastro-intestinal cases. The cereal grains are barley, buckwheat, corn, oat, rice, rye and wheat. When one reacts usually several do and not infrequently all may react

in varying degrees. With the exception of buckwheat these cereal grains are grass seed and hence are of related species. In order of their frequency, the cereals reacted as follows: corn reacted in 46 per cent, barley reacted in 31 per cent, rye in 29 per cent, wheat in 18 per cent, oat in 16 per cent, rice in 12 per cent, and buckwheat in 11 per cent.

One of the first foods about which everyone wants to know is egg. In my experience egg is one of the least common causes of allergic symptoms. It reacted in 7 per cent of the hundred miscellaneous cases and in 10 per cent of the gastro-intestinal group. Egg, when it is allergically active, is frequently productive of violent reactions, both locally on the skin and constitutionally. Consequently egg sensitive individuals frequently discover this fact without the aid of skin tests. Many people who are sensitive to egg will tell you so when they come to the office. This is in marked contrast to milk, to which few people have more than a faint suspicion of their sensitivity.

The next most common reactors after the cereal grains were some of the vegetables. The most common vegetable reactors in alphabetical order were the bean-pea family, various members of which reacted in 44 per cent. Next was eggplant with 33 per cent of reactions, then spinach 76 per cent, squash 28 per cent, and tomato 68 per cent. From this it is seen that spinach and tomato were the most common vegetable reactors, followed closely by the bean-pea family, eggplant and squash.

A group of allergens listed together for convenience as condiments furnished the next most common reactors. Chocolate in this group reacted in 45 per cent of these cases, vanilla reacted in 10 per cent, mustard in 17 per cent, and ginger in 7 per cent.

The meats, by reason of their high protein content, are suspected by nearly everyone. In my experience they are uncommon causes of trouble. Oyster was the most common reactor in this group with 28 per cent. Trout reacted in 14 per cent and lamb in 12 per cent of my cases. No other meats reacted in as many as 10 per cent of these cases and beef and pork were among the least common reactors of all.

Of the fruits, peach was the most common reactor, 20 per cent. No other fruit reacted in as many as 10 per cent of my cases. Prune reacted in 9 per cent, while grape and grapefruit each with 8 per cent were next. Blackberry and strawberry reacted in about 10 per cent. Various nuts reacted in about 10 per cent, and the melons reacted in about 15 per cent. Tea reacted in 14 per cent and coffee in 7 per cent of these cases.

The court of last resort in judging of the role played by any allergen in the production of allergic symptoms is clinical trial. In almost all cases of allergy some of the reactors are causing the symptoms while others are not. Also, there are many cases in which allergens which are actually giving symptoms give no skin reactions at all. The remarkable thing about the skin tests to me is that they are helpful in a large percentage of cases, and not that they fail us in occasional tests.

Allergens show selective affinities for different localizations in the skin or mucous membranes in different individuals. Milk sensitivity, for instance, will be manifested by nasal symptoms in one individual, by stomach symptoms in another, and by bronchial symptoms in a third. A patient in my series who is sensitive to cereals says that corn affects her like a big dose of salts and gives her colicky pains in the abdomen and loose stools, while wheat causes her to itch and have an urticarial rash. For this reason alone the fact that an allergen reacts on the skin does not necessarily mean that it causes the symptoms for which the patient is being treated.

The proper procedure in starting treatment is to remove the patient from contact with all inhalant allergens as far as possible, to treat hypodermically for those inhalants which cannot be avoided and to remove from the diet all food allergens which react. The foods should be omitted from the diet until the patient is symptom-free and then they are to be resumed one at a time until return of symptoms points to offending allergens.

One very common cause of failure to get results in allergic dieting is lack of thoroughness in following out treatment. Foods which react must be completely eliminated from the diet. To illustrate this point I find that it is necessary to eliminate, in milk-sensitive cases, not only the mere drinking of milk, but also the use of cream, butter, cheese and all articles of food cooked with these. And the same degree of thoroughness is necessary with all other reacting foods.

In the series of nineteen gastro-intestinal cases reported here I have been able to study personally only twelve. In this number, milk has been definitely proven to cause symptoms in ten, cereals in three, and egg in one. Tomato, the

bean-pea family, spinach and chocolate were next most important causes of trouble, while about seventy-five other foods each played a part in one or more cases. In my personal experience there are practically no cases of allergy in which one single allergen is the cause of all symptoms. In most cases from five to forty or fifty seem involved.

In addition to the skin tests there are several other tests which are helpful in the diagnosis and treatment of allergy. The first which comes to mind is eosinophilia. In my personal experience blood eosinophilia has been a very uncertain guide. Not more than 50 per cent of my cases have ever shown definite eosinophilia. When it does occur, however, it is very suggestive of the presence of allergy.

The presence of large numbers of eosinophils in the bronchial mucus in asthma is an old observation. Hansel[1] has recently pointed out the significance of finding large numbers of eosinophils in the mucus of nasal secretions in nasal allergy. This suggests the probability of the finding of eosinophils in the mucus from intestinal discharge in allergy of the gastro-intestinal tract. In my series only one case had mucous colitis and that patient was not examined for eosinophils. The presence of large numbers of eosinophils in this mucus would be presumptive evidence of allergy as a cause of the trouble.

Vaughan[2] has recently made an interesting contribution in his "Leukopenic Index." He has shown that in allergic individuals the eating of foods to which the patient is sensitive will be followed by leukopenia instead of the usual leukocytosis. This decrease in the blood leukocytes varied with the particular food and with the individual case. It also occurred within the first ninety minutes after eating. This test can be applied to only one food at a time and consequently will be helpful only in case of doubt about one or more particular foods and not in the diagnosis of the constitutional state.

Several of my cases have shown complete absence of acid in the gastric contents, while others have had low acid values. This has not been a constant finding, as some have had normal values, though none has been definitely high. The histories of several cases suggested that they had had hyperacidity in earlier stages of the condition to be followed by hypo-acidity in later stages. This observation has been made by numbers of workers in the past. It is of value chiefly in treatment, as most of the cases with low acid will be benefited by administration of hydrochloric acid. I was interested to note that several of my patients with low acid were taking soda. They all felt better after changing to acid.

Several of my cases were benefited during attacks of acute pain by administration of epinephrine by hypodermic or of ephedrine by mouth. This fact is of benefit in both diagnosis and treatment, as one would hardly expect the pain of acute appendicitis to fade away following the administration of a hypodermic of epinephrine chloride or the taking of a capsule of ephedrine sulphate.

Although these latter tests are presumptive evidence for or against the presence of the constitutional state of allergy, nevertheless the intradermal skin tests are the basis on which the diagnosis and treatment of all allergic conditions rests. It is my belief that all cases of chronic stomach disorder should have careful and thorough allergic study.

We all know that there are large numbers of people for whom allergic study is not obtainable and for them we can offer a measure of benefit based on experiences gained in testing and treating large numbers of cases. Treatment for them should consist in removal from contact with most common inhalant allergens and trial diets composed of the least common food reactors.

Judging from the experiences gained in treating this group of cases, such trial diets should be based on egg and the vegetables which are least common reactors. The vegetables in this category are asparagus, beet, carrot, cauliflower, celery, endive, kale, lettuce, okra, onion, potato, sweet potato and turnip. In addition to these a number of meats should be included. These are beef, pork and chicken, all of which were uncommon reactors. Almost all fruits are admissible, peach being the only one to exclude. In this study banana and pear did not react in a single case, and most of the others in less than 5 per cent of these cases.

It is difficult to eliminate milk and all of the cereal grains for any length of time and of these the first to readmit to the diet are the cereals in the following order: (1) rice, (2) oat, (3) wheat, and last, rye and corn.

The berries, nuts and melons as well as tea and coffee should be omitted from trial diets on allergic grounds alone.

CONCLUSIONS

(1) Allergic sensitivity is the cause of many cases of chronic gastro-intestinal upsets of all grades of severity.

(2) Every case of chronic "stomach trouble" should have thorough allergic study, especially before resort is had to surgical procedures.

(3) In those patients for whom allergic study is not obtainable, elimination of the most common inhalant reactors, together with trial diets based on experience with large numbers of cases, offer hope of benefit.

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DISCUSSION (*Abstract*)

Dr. John P. Henry, Memphis, Tenn.—According to Dr. Davidson's statistics, approximately one out of every ten of his allergic patients (9.5 per cent) complain of indigestion and another 3.5 per cent complain of headache. He mentioned 200 cases, so we have reviewed a similar number of consecutive records and find that one out of every ten has consulted us on account of symptoms referable to the gastro-intestinal tract and one out of every ten on account of headache, thus making a total of 20 per cent. When we take into consideration the urticarias, eczemas and other types of allergy it is apparent that food allergy is very common.

Concerning the foods which react most often, our statistics are not in accord with those reported by the essayist. Practically all who have made a study of this subject agree that the three most commonly used foods, namely, wheat, egg and milk, are the ones most often responsible for positive skin reactions and most authors report wheat as giving the highest percentage, but in our series, based upon intradermal tests, egg gives the largest number of positive reactions (68.5 per cent), then wheat (62.5 per cent), and finally milk (47.5 per cent). These figures represent skin reactions and by no means do they indicate clinical symptoms in anything like such high percentages. We have stated repeatedly that positive reactions to foods may represent past, present or future history. As Dr. Davidson has brought out, the burden of proof is upon the clinician, so the only sensible way to deal with foods showing positive reactions is to take them out of the diet for a trial period of about three weeks. Each and every food is then deliberately added, one at a time, and only those foods which can be proven harmful at the present are eliminated.

Our experience with meats is similar to that of Dr. Davidson in that lamb and beef seem to cause very little trouble. A few who are extremely sensitive to egg cannot tolerate chicken. We never use shell fish in our trial diets, since they are frequent offenders. He mentions eggplant and spinach as frequent reactors, but in our testing sets these two foods have a tendency to produce non-specific reactions. Also, we do not obtain anything like the number of reactions to tomato that he does. Because egg is our most common reactor, we never build a trial diet around this food as suggested, nor would we include onion, as it frequently causes gastro-intestinal discomfort or headache. When we have a fairly comprehensive list of non-reacting foods from which to select, we do not include tomato or other uncooked vegetables and fresh fruits during the trial period, since allergic individuals seem to tolerate cooked foods better. To illustrate: some can take toast, but not biscuit or plain bread; others boiled, powdered or condensed milk, but not fresh milk; and still others hard boiled eggs, but not fried, scrambled or soft boiled.

In dealing with gastro-intestinal problems, it has been our experience that another group of foods are often at fault and are as follows:

Raw apple
Turnip
Brussels sprouts
Onion (particularly raw)
Cucumber
Radish
Green peppers
Cabbage

and other foods of that type. It is also true that these foods often fail to react on skin testing, or when they do the reactions may be insignificant. However, the size of a skin reaction is not entirely dependent upon the degree of sensitization. When a patient is sensitive to pollens, whose composition is more or less uniform, we can estimate fairly well the degree of sensitivity by comparing the reactions, but when dealing with foods we must remember that their structural composition varies considerably. For example: a patient may be equally sensitive to egg and cabbage from the clinical standpoint, but egg will invariably give a much larger reaction because of its 50 per cent protein content, whereas cabbage may give a negligible reaction or none at all on account of its very low protein content. Therefore, to you as gastro-enterologists, I should like to stress the fact that too much emphasis should not be placed upon skin tests alone. The history is equally important and if the above facts in regard to interpretation are thoroughly understood, it aids greatly in properly evaluating reactions.

As mentioned in the paper, individuals with allergic gastro-intestinal tracts may complain of symptoms arising from any portion, such as herpes labialis, ulcers in the mouth, symptoms of ulcer, diarrhea or colitis from certain foods and the spastic type of constipation from others. Occasionally gastro-intestinal urticaria will produce all the symptoms of an acute abdomen. In my experience one of the most common types of gastro-intestinal allergy encountered is that vague type of chronic "indigestion" characterized by epigastric fullness, belching, sometimes pain, and a history of qualitative food dyspepsia. More often low acid values are found as stated. In other words, the symptoms of chronic cholecystitis.

I am sure it has been your observation that patients with true cholecystitis are likely to notice discomfort after ingestion of one or more of the foods in the group mentioned above (cabbage, onion, raw apple). Likewise, the allergic patient with sensitive liver cells and a normal gallbladder may exhibit the same symptoms. Although all tests may fail to reveal a pathologic gallbladder in an allergic individual, skeptics may say that the gallbladder is diseased nevertheless. I rather doubt this, because many whom we see have had both the appendix and gallbladder removed, but their symptoms are the same as before operation. Furthermore, they do not obtain relief until elimination of the foods to which they are allergic. If the evidence is not conclusive, and in the absence of acute symptoms, I think, as Dr. Davidson has mentioned, the patient should be given the benefit of the doubt and investigated from the allergic standpoint before resorting to surgery.

In conclusion, the importance of milk has been mentioned and I should like to reiterate that this food is a frequent offender. It should also be borne in mind that tuberculous patients may experience much gastro-intestinal discomfort, as well as others who use milk. An occasional individual with peptic ulcer either fails to obtain relief or has symptoms intensified as the result of a coexisting sensitization.

Dr. Charles H. Eyermann, St. Louis, Mo.—You have heard an excellent summary of the clinical experience of one who recognizes allergy as the possible cause of gastro-intestinal symptoms. In a comparison of these clinical experiences with those of physicians similarly inclined, there will be differences as to detail, due to inherent difficulties of the various procedures necessary to make such a diagnosis and to the intangible shortcomings of the human equation.

For example, in our own experience, skin sensitivity does not occur as frequently as here reported, nor does it occur in the same percentage frequency to the foods mentioned, which prompts the query whether data are available as to the correlation of skin and clinical sensitivity. In other words, what is the diagnostic efficiency of the skin test in this series of cases? Again, our experience differs from that of Dr. Davidson in that egg and onion are more frequent etiological factors than he has found and could not be included in our trial diets.

The skin test has definite limitations due to technical difficulties and to errors in reading and in interpretation of the tests and does not always or necessarily indicate clinical sensitivity. Nevertheless, the preliminary trial diet should be made up of foods that give no skin reactions and also of foods suspected from the clinical history of being causative agents. Subsequent trial diets should be formulated from the information gained by clinical observation and from the dietetic diary.

The discrepancies between Dr. Davidson's and our experiences, however, do not invalidate the fact, stressed by his presentation, that allergy is often the cause of both acute and chronic symptoms referable to the gastro-intestinal tract and that it is frequently overlooked.

Dr. Horace W. Soper, St. Louis, Mo.—The allergists have made a definite contribution to gastro-enterology, but the subject has been very complex. Too many patients suffer from malnutrition because of food restriction. Something must be done to desensitize them.

Some five years ago a woman patient, aged 50, had very severe attacks of asthma. She was allergic to nearly all the contacts and many foods. Finally, at death's door from exhaustion, we resorted to full doses of morphine hypodermatically, one-quarter grain every four hours, arousing her every two hours for milk punch feedings. Treatment was discontinued at the end of the third day. She has never had a recurrence of her asthma, eats all foods, and resumed all her contacts, including orris root.

I could relate other cases not so spectacular. A patient had severe urticaria after eating eggs, milk or chocolate. She was given a large chocolate egg milk shake every two hours and a one-half grain calomel and soda tablet every night. She reacted, and large wheals covered her whole body. They disappeared in ten days and she has had no allergic manifestations since, a period of one year, although partaking freely of the offending foods.

I have termed this method "the shock treatment of allergy." The explanation of the phenomenon is not clear. We may assume at present that the body cells are so profoundly influenced that a readjustment occurs and they cease to react in an abnormal fashion. The patient should be hospitalized and morphine should be given freely if the reaction is severe.

Dr. Davidson (closing).—I would strongly advise against the shock treatment of allergy. One of the characteristics of allergy in the human being which differentiates it from anaphylaxis in animals is that whereas the anaphylactically sensitized animal acquires a good deal of immunity following a shock dose of antigen, the allergic human acquires very little and can be repeatedly shocked by the same or nearly the same dose.

I fear from the trend of Dr. Henry's and Dr. Eyermann's discussions that my paper gave the impression that I put all my trust in the results of skin tests. I said, however, that the clinical trial was the court of last resort and also that many times foods causing symptoms failed to give skin reactions. This must be determined by the results of the clinical trial on the patient.

Nevertheless, I must admit that I do put more reliance on the results of my skin tests than seems to be the custom with many of my fellow allergists. My testing materials are almost all made in my own laboratory and I know with what care the materials are selected and the laboratory procedures are followed out. I feel, therefore, that my allergens are worthy of much respect.

There will necessarily be many differences in our experiences with percentages of reacting allergens until methods of standardization of testing materials are perfected. I felt that in this paper the question of the actual allergens causing symptoms was the minor factor. The real object of the paper was to stress the fact that allergy is the cause of many cases of gastro-intestinal upsets of various types and degrees. Also that all cases of chronic "stomach trouble" should be studied from the allergic angle.

A COMPARISON OF THE KLINE AND NOGUCHI MODIFICATION OF THE WASSERMANN TEST*

By EARL B. RITCHIE, M.D.,
San Antonio, Texas

The following report embraces a survey of 2,123 tests recorded in the period of four years in a small hospital laboratory. The Kline diagnostic test was done using the very sensitive antigen emulsion, and with this the Noguchi modification of the Wassermann test, using a cholesterinized Kolmer antigen. All reports recorded in this record were of tests done on blood serum. A brief analysis of these records ensues under the headings of negative agree-

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*Read in Section on Dermatology and Syphilology, Southern Medical Association, Twenty-Ninth Annual Meeting, St. Louis, Missouri, November 19-22, 1935.

*From the Laboratory of the Medical and Surgical Memorial Hospital, San Antonio, Dr. Henry Hartman, Director.

ments, positive agreements, disagreements, and doubtful reactions.

Negative Agreements.—There were 1,570 instances of negative agreements in both tests. Twenty-two of these occurred in cases of proven clinical syphilis having received treatment.

Positive Agreements.—Three hundred seventeen instances of frank positive agreement revealed 12 false positive reactions. There were 305 positive agreements in proven syphilis.

Disagreements.—Sixty-eight frank disagreements showed 50 instances of disagreements in proven syphilis. Of these 50 disagreements the complement-fixation test was positive in the face of a negative Kline 22 times, while the Kline was positive and the complement-fixation test was negative 28 times. There were 18 instances of disagreement which were considered false reactions, 9 positive complement-fixation reactions with negative Kline, and 9 just the reverse.

Doubtful Reactions.—There were 168 doubtful reactions recorded and of these 70 were shown to occur in cases of proven syphilis. Of these, 19 instances of doubtful reactions in both tests and the remainder equally divided in doubtful disagreements between the two tests. There were 98 doubtful reports recorded in routine non-syphilitic patients.

COMMENT

Further analysis of the foregoing statistics will show that both tests agree with the clinical observations of the patient in 87.2 per cent of cases, this including both syphilitic and non-syphilitic cases. In 12.8 per cent of cases there was disagreement; false positive reactions or doubtful reactions were recorded.

There were 447 tests done on 229 cases of syphilis and of these there was positive agreement in 68.2 per cent of cases. Both tests were negative in proven syphilis in 4.9 per cent of cases. There was 11.2 per cent of disagreement in syphilis and 15.7 per cent of doubtful reactions were recorded in syphilitic cases.

It is, therefore, found that the Noguchi modification of the Wassermann reaction agreed with the clinical condition of the patient in 88.3 per cent of instances, while the Kline so agreed in 88.6 per cent of cases. These figures are considerably lower than those reported by the author* previously, when the Kline test agreed with the clinical observations on the patient in 96.8 per cent of cases. The difference noted in this report can be traced back to the relatively large number of doubtful reactions which were not recorded in agreement percentages because of the apparent difficulty in interpretation.

The actual cost of performing the Noguchi-Wassermann and Kline tests on blood serum was estimated as closely as possible, revealing that in this small laboratory the Wassermann test costs $1.62 per test, while the Kline per test cost is 21 cents. It was again estimated that about 33 per cent of patients paid the full fee of $5.00 per test, while another 33 per cent paid half fees and the final 33 per cent could not afford the 50 per cent fee and eventually paid nothing.

In an attempt better to meet the economic condition without lowering the quality of laboratory service, the following recommendations have been made to the attending staff of the hospital:

(1) All patients routinely are to have only the Kline test performed unless both tests are requested by attending physician.

(2) When a doubtful or positive test occurs, this should be repeated and checked with the complement-fixation test.

(3) In all cases where syphilis enters into the diagnosis both tests should be used.

(4) In all patients under treatment for syphilis, both tests should be done throughout as a guide to progress and result of treatment.

205 Camden Street

*Ritchie, Herrick and van de Erve: Practical Clinical and Laboratory Aspects of Precipitation Tests for Syphilis. Arch. Dermat. & Syphilol., **29**:835-844, June, 1934.

DISCUSSION (*Abstract*)

Dr. Richard S. Weiss, St. Louis, Missouri.—If a large group of serums is taken at random from a general hospital or clinic population and these are tested in the same laboratory by several different Wassermann antigens or by the Wassermann and one or more precipitation tests, there are sure to be some contradictions in the reports. If serums from a similar group of patients are sent to two different laboratories, each one using the same technic, again contradictions in the reports are sure to be encountered. If the same group of patients is tested repeatedly over a period of weeks contradictory reports again crop up. These contradictions are sometimes a perplexing problem and especially so when the sensitivity of the usual tests varies greatly in different laboratories.

It is certain that some syphilitic serums contain an excess of native amboceptor and will give false negative results and even a mild bacterial contamination or the presence of some unknown substance may set up an anti-complementary result with a Wassermann reaction and it is known that both of these sources of error are lacking in the precipitation test. We must also consider the possibility of technical error inherent in either type of test and the occasional fallibility of the technician.

Therefore, we believe that it is highly desirable that the Wassermann test be checked by one of the precipitation tests and our belief is not based on the idea of making two different tests of varying sensitivity.

Our interpretation of conflicting tests has about the same significance as a single laboratory report of "doubtful." When a physician receives a conflicting report there are only two possibilities to consider; either the positive report is a laboratory error or the patient is actually syphilitic, his serum containing such a small quantity of reagin that the latter can be detected only by a very sensitive technic.

When we get a report of this character our duty is to continue making serial tests, to use provocative treatment and to see whether we can provoke a positive test and we can come to a conclusion only when we have had numerous reports and have taken these into consideration with the history, the amount of treatment received, and so on.

I am inclined to agree with Dr. Ritchie's conclusions in all respects and especially so in the case where syphilis enters into the diagnosis. Moreover I agree with him that all patients under treatment for syphilis should have both tests done throughout as a guide to progress and to treatment.

AN IMPROVED TECHNIC FOR CATHETERIZING THE MALE BLADDER*

By GEORGE WALKER, M.D.,
Baltimore, Maryland

Inquiry as to the method of catheterization in various hospitals and in private practice has shown that in many instances the operation is done in a manner which too often causes cystitis and other infections of the genito-urinary tract.

I have records of a number of cases of cystitis which have been induced by emergency catheterization following operations.

A few illustrations will be given:

Case 1.—A man, aged 56, entered the hospital for a radical cure of hernia. He had a slight enlargement of the prostate, but had not complained of any difficulty in micturition. The urine was clear. Following the operation he was unable to void and had to be catheterized. This was done eight times. Acute cystitis developed and continued with more or less severity for several months. Three weeks after the onset of the cystitis he had an epididymitis which resulted in a large abscess, necessitating drainage.

Case 2.—A man, aged 44, entered the hospital for hemorrhoidectomy. The urine was clear and no urinary symptoms were noted. After the operation he had to be catheterized twice daily for four days. Acute cystitis followed and pus was present in the urine when he was seen one year afterwards.

Case 3.—A man, aged 27, entered the hospital for an appendectomy. He had a clear urine and no urinary symptoms. Catheterization was necessary six times following operation. Pus appeared in the urine and was still present eight months afterward. During that period he had the usual symptoms of cystitis.

Case 4.—A man, aged 37, entered the hospital for hemorrhoidectomy. There were no urinary symptoms and the urine was clear. He was catheterized ten times. Acute cystitis developed. Some weeks after he had a double epididymitis and two years later he had a marked chronic cystitis.

Case 5.—A man, aged 36, entered the hospital for a radical cure of hernia. He was catheterized twelve times. One year afterwards he was found to have chronic cystitis.

Case 6.—A man, aged 52, entered the hospital for an exploratory laparotomy. There was a slight enlargement of the prostate, but the urine was clear. He was catheterized twice daily for one week. Acute cystitis and epididymitis developed and later he had symptoms of pyelitis. This condition became chronic and three years afterwards he showed evidence of marked urinary infection.

Case 7.—A man, aged 34, entered the hospital for an appendectomy. The urine was clear. He was catheterized six times. Cystitis and prostatitis developed, and when seen two years afterwards his urine contained a large amount of pus. He had lost twenty pounds in weight.

The above cases were selected from a larger series and are sufficient to indicate that somewhat grave complications may arise from unclean catheterization.

The technic which is often followed in hospitals is contrary to all principles of surgical cleanliness and illustrates the survival of preantiseptic days.

An orderly is directed to put a protecting sheet under the patient and to cleanse the genitalia with soap and water. This procedure is usually carried out by him without cleansing his hands or without putting on sterile gloves. He moistens a sponge with soap and water and superficially scrubs the glans, meatus and the remainder of the organ; he then pours over a little water to remove the soap and wraps a sponge just behind the glands. The interne then takes a sterile catheter with a sterile clamp, lubricates it and introduces the catheter into the urethra, catching the skin just behind the glans with his bare hand. If the catheter passes easily, well and good, but if obstruction is encountered, it very often becomes necessary for him to take the catheter in his hands. This he does without first cleansing his hands properly. Lately the wearing of gloves by the internes has become more common, but the reprehensible procedure of allowing the orderly to clean up the patient still persists.

The attempted cleaning up by the orderly is worse than useless because, by his manipula-

*Received for publication October 28, 1935.

tions, he smears bacteria over the glans and meatus from his unclean hands.

In private practice catheterization is occasionally carried out with an unboiled catheter introduced by unwashed hands.

The method which I have used for some time is as follows:

(1) Put the patient on a large broad douche pan with wings extended on each side to catch the water which may drain over the abdomen and hips.

(2) The operator washes his hands thoroughly in warm water and soap, soaks them in 1:1000 bichloride solution and then slips on a pair of sterile rubber gloves.

(3) The operator washes the genitalia, the lower part of the abdomen and the inner side of the thighs thoroughly with green soap and warm water and with 1:1000 solution of bichloride.

(4) The operator then removes his gloves and puts on a second pair of sterile ones.

(5) A sterile towel is then placed over the upper part of the right thigh and the glans brought over to rest upon it. A second sterile towel is placed across the lower portion of the abdomen.

(6) The douche bottle is now taken out of its container and hung on the upright pole. The assistant pours into it about 250 c. c. of warm normal salt solution. Neither the bottle, the nozzle nor the tubing is touched by anyone save the operator. The operator then thoroughly irrigates the urethra. This is done by first allowing the stream of salt solution to flow over the meatus, after which the cone-pointed glass nozzle is inserted into the meatus and the urethra alternately distended and evacuated with salt solution. The whole amount of 250 c. c. is used for the irrigation.

(7) The catheterization tray containing the sterile rubber catheter, a small syringe and a small medicine glass is then opened by the orderly. The glass and syringe are taken out of the tray by the operator. Two drams of sterile procaine hydrochloride solution (3 per cent) is poured into the medicine glass by the orderly; this the operator slowly and carefully injects into the urethra. The solution is held in with the thumb and forefinger of the operator for one minute. After this, two syringefuls of sterile olive or cotton seed oil are injected. Oil in sufficient quantity to pass into the bladder should be used, so that the whole urethra will be lubricated.

(8) The operator then takes the soft rubber catheter in his gloved right hand and inserts it slowly and gently up the urethra into the bladder.

(9) After evacuation of the water, the catheter is withdrawn without being followed by any irrigation or the instillation of any antiseptic fluid. If the technic has been perfect no antiseptic is necessary.

(10) If catheterization is to be repeated a number of times, it may be advisable to instill half an ounce of a 10 per cent silver protein solution through the catheter just before it is withdrawn.

(11) Give the patient 7½ grains of hexamethyline four times daily for three days. If the urine is alkaline add 30 grains of sodium acid phosphate three times daily for three days. If catheterization is to be repeated, these drugs should be kept up longer.

Following these rules carefully, I have catheterized many patients twice daily for six weeks without causing the least infection of the bladder.

Irrigation of the anterior urethra is a very important procedure and greatly facilitates the aseptic method of sterilization. The necessity for this has been proven by the following:

Personal studies made from time to time on the flora of the male urethra have shown that organisms may be found as far down as three inches. Possibly they extend beyond that limit, but it is very difficult to get a technic which will prove their presence at deeper levels. For the most part, these organisms are probably not harmful, but unquestionably from time to time virulent staphylococci and streptococci are present. When a catheter is introduced without any cleaning up of the urethra, the bacteria present may be carried back into the bladder, where they lodge and produce infection.

A systematic study was made in 127 cases. Cultures were taken from the anterior urethra after the external genitalia, lower part of the abdomen, inner surface of the thighs and the perineum had been thoroughly washed with warm water and soap and then with 1:1000 bichloride of mercury solution. A second set of cultures were taken after the urethra had been thoroughly irrigated. The cultures were made by inserting a platinum loop into the urethra for 2½ inches, rubbing it against the walls of the urethra, then withdrawing it and making the culture on nutrient agar.

The irrigation of the urethra was done in 25 cases with 250 c. c. of 1:50,000 bichloride solution. The remainder were irrigated with 250 c. c. of normal salt solution. The percentage of positives was so nearly the same that normal salt solution was adopted as a routine procedure.

In cultures made after cleansing the external genitalia but before irrigation 92 (72.44 per cent) were positive and 35 (27.56 per cent) negative. After irrigation of the same patients, there were 122 (86.07 per cent) negative and 5 (3.93 per cent) positive cultures.

The organisms found in the urethra were streptococcus, *Staphylococcus albus, aureus* and

citreus, Diplococcus urethrae, B. coli, B. subtilis, Proteus vulgaris, a diphtheroid bacillus and several unidentified bacilli.

This study surely indicates that virulent organisms are harbored by the anterior urethra and that in the absence of proper cleansing of the canal by irrigation, these organisms may be carried into the bladder and cause infection.

It further emphasizes the fact that a preliminary irrigation of the urethra is a very necessary adjunct.

In conclusion, may I repeat that the method of catheterization which is carried out in many hospitals and in private practice is an amazingly careless procedure and one which not infrequently produces a life-long infection of patients.

EXTREME NITROGEN RETENTION IN A CASE OF CARCINOMA OF THE BLADDER*

By W. N. Blount, M.D.,
Laurel, Mississippi

We often see, hear or read of cases with a slight to a moderate increase of creatinine and urea nitrogen in the blood; but few, if any, cases have been reported with such an extremely high percentage of these constiuents as was found in the case to be described. This is a case of carcinoma of the bladder with metastasis, the growth obstructing and obscuring the ureteral orifices, terminating in death after ten days of complete anuria.

CASE HISTORY

A man, 43 years of age, living in Mobile, Alabama, was referred to me and admitted to the hospital in December, 1933, complaining of hematuria. Several days previously he had noticed a moderate amount of blood in the urine. The hematuria was of brief duration. There was no other complaint.

Dr. J. Rufus Johnson, of Jackson, Mississippi, urologist, a member of my staff, was called in consultation.

Physical examination showed slight tenderness over the lower abdomen, with no other abnormal findings.

Cystoscopy disclosed a normal bladder except that an area the size of a small coin, situated posterior and mesial to the left ureteral orifice, was elevated, hemorrhagic and necrotic. Indigo-carmine injected intravenously appeared at the end of four or five minutes at both ureteral orifices intermittently in excellent concentration. There were several small cysts at the vesical neck and a mild degree of inflammation of the posterior urethra.

A flat kidney-ureter-bladder roentgenogram was negative. A diagnosis of small carcinoma of the bladder was made and fulguration was advised. At the patient's wish he was discharged from the hospital to return in a few days for fulguration. However, he did not return until the following December, a year later.

He gave as his reason for not having returned for fulguration, that he felt better after leaving the hospital, that he was afraid of the fulguration, and so forth. Until a few months before his second admission he felt satisfied with the treatment that he was getting or was giving himself for the occasional attacks of bloody urine and passing of fleshy lumps. Various drugs and remedies suggested by quacks and herb doctors, and chiropractic treatments, plus bladder irrigations and prostatic electrolysis carried out by himself seemed to give relief. A short time before the second admission he called in his family physician, Dr. Cowden, of Mobile, who referred the case to me and I in turn referred him again to Dr. J. Rufus Johnson for the necessary treatment at the Baptist Hospital in Jackson.

The patient then complained of hematuria, abdominal distention and pain over the entire abdomen, most severe over the suprapubic region and the left flank. There were occasional attacks of diarrhea with small stools.

Physical examination revealed an acutely ill male, cachectic in appearance, with a dry, non-elastic skin showing a very mild icterus. His chest was normal and blood pressure 170/100. The abdomen was distended and protuberant, showing evidence of an accumulation of fluid in the peritoneal cavity and a typical "caput medusae." There was tenderness over the entire abdomen, tenderness to fist percussion over the left renal area, and slight edema of the penis. The prostate was apparently normal.

Cystoscopy showed poor bladder capacity and tolerance. A tumor mass, elevated, hemorrhagic and necrotic, covered the bladder floor and neck, completely obscuring both ureteral orifices. Indigo-carmine, after intravenous injection, did not appear in thirty-five minutes. Intravenous urography was contraindicated because of the beginning uremia and possible liver involvement.

For two days after admission to the hospital the patient refused to cooperate and would not permit blood chemical analysis or cystoscopy. His greatest wish was for something to relieve the nausea and vomiting which began shortly after his admission. The nausea and vomiting continued throughout the period of hospitalization and all attempts to relieve them met with complete failure.

January 2, 1935, on admission, he voided 40 c. c. of urine of specific gravity 1.006, acid, with no sugar, but three plus albumen. No casts were seen, but the field was obscured by many bacteria with a few rare clusters of Gram-negative intracellular diplococci, many pus cells and a few red blood cells.

There were 21,900 leukocytes per cu. mm. of blood, 4,260.000 erythrocytes, 83 per cent polymorphonuclears, 74 per cent hemoglobin, 14 per cent lymphocytes, and 3 per cent monocytes.

On January 3 he voided 30 c. c. of urine.

January 4, the second day after admission, his urea nitrogen was 83.0 mg. per 100 c. c. fo blood and cre-

*Chairman's Address, Section on Railway Surgery, Southern Medical Association, Twenty-Ninth Annual Meeting, St. Louis, Missouri, November 19-22, 1935.

atinine was 9.0 mg. per 100 c. c. The urea clearance test was 2 per cent. He voided approximately 40 c. c. of urine on this date and no further specimen was obtained either voided or by catheterization.

On January 8, the sixth day of hospitalization, his blood urea nitrogen was 180.0 mg. and creatinine 19.0 mg. (The creatinine value had gone so high that we made up a special standard in order to determine it accurately.)

On January 9, the seventh day of hospitalization, his urea nitrogen was 195, and creatinine 24; 2,700 c. c. of fluid were withdrawn from the abdomen by Dr. Johnson. Its specific gravity was 1.008 and it contained a large amount of albumin.

January 13, the eleventh day of hospitalization, the urea nitrogen was 190, creatinine 24, and 1,500 c. c. of fluid were withdrawn from the abdomen by Dr. Johnson. It was not examined.

January 14, the twelfth day of hospitalization, the urea nitrogen was 205 and creatinine 23.0. mg. per 100 c. c.

On January 15, the patient expired suddenly at 4:10 a. m.

As you will note, during the period of hospitalization the urea nitrogen increased from 83.0 to 205 mg. per 100 c. c. The creatinine increased from 9.0 to 24.0 mg. per 100 c. c. Normal urea nitrogen is 12 to 20 mg. and normal creatinine 1 to 3 mg. Anuria continued for ten days prior to death without indication of coma at any time, even within a few minutes of death. The urea clearance test on the second day after admission was 2 per cent. The normal per cent is 70, and when it falls as low as from 10 to 5 per cent, coma is supposed to be immediately impending.

No attempt at surgery was made in view of the increasing uremia. Various amounts of 10 to 25 per cent glucose were given intravenously daily, occasionally with insulin, as well as other measures with the hope of restoring part of the renal function, but these met with failure.

Since relatives of the patient would not permit an autopsy, the extent of metastasis was not known.

This case was reported because of the extremely high urea nitrogen and creatinine retention and because of my failure to find in the literature a similar case.

In closing, since this case began with the dangerous symptom of hematuria, I wish to stress the necessity of investigating thoroughly every case in which hematuria is a symptom. A complete urological examination is required, not merely an examination of the urine, with dismissal of the case if the bleeding ceases. The source of the hemorrhage, regardless of how slight it may be, must be ascertained and the proper treatment instituted immediately, to prevent extreme conditions like the above.

THE IMPORTANCE OF AN ORGANIZED CANCER CLINIC*

By QUITMAN U. NEWELL, M.D., F.A.C.S.,
St. Louis, Missouri

The necessity of an intensified attack upon the problems arising from malignant disease becomes daily more apparent. With more accurate statistics, with better means of diagnosis, the increased mortality in cancer is becoming appalling. It is now second to heart disease in frequency and if we do not soon control its spread it will head the list of fatal diseases. In former years, when cancer was attacked only by surgery with the result that the attack was ineffectual, general opinion was extremely pessimistic as to the outcome of the treatment. However, recently everywhere throughout the world the investigation of cancer has been broadened and the plan of attack upon its occurrence has gradually developed. Today a well organized cancer clinic is necessary if we are going to make any advancement in the handling of cancer diagnosis and treatment.

In 1930, the Board of Regents of the American College of Surgeons announced its policy of spreading information concerning cancer to every person in the country. The College published information concerning the cancer clinic movement and requested all hospitals of over 100-bed capacity to consider their organization. Four years later the College announced a list of the hospitals which are conducting cancer clinics which conform to its minimum standard. The conduct of such clinics varies somewhat according to the character of the hospital with regard to whether its patients are charity patients or otherwise. Some institutions have established diagnostic clinics, but refer the patients elsewhere with advice as to the nature of the treatment that should be given. In other large institutions some departments have organized cancer clinics for the recognition and care of cancer in their patients, while other departments have not so organized.

Some institutions have accepted the minimum requirements for cancer clinics, but for one reason or another have not been able to get things started.

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*Read in General Clinical Session, Southern Medical Association, Twenty-Ninth Annual Meeting, St. Louis, Missouri, November 19-22, 1935.

*From the Department of Obstetrics and Gynecology, Washington University School of Medicine, and Barnes Hospital.

In February, 1934, the American College of Surgeons announced 140 well organized cancer clinics, mostly connected with general hospitals in the United States. We have two such clinics in St. Louis, one at the Barnes Hospital and the other at the Bernard Free Skin and Cancer Hospital.

In 1929, the gynecological department of Washington University School of Medicine and Barnes Hospital formed a cancer clinic, which has rapidly grown to a well recognized gynecological cancer clinic, and now at Barnes Hospital we are in the process of forming a general tumor clinic which comprises all the different departments of the Hospital.

The minimum standard for cancer clinics in general hospitals as recommended by the American College of Surgeons is as follows:

(1) *Organization.*—There shall be a definite organization of the service, and it shall include an executive officer and representatives of all the departments of the hospital which are concerned in the diagnosis and treatment of cancer. The services of a secretary and of a social worker shall be available.

(2) *Conferences.*—As an essential feature of the service there shall be regular conferences or consultations at which the diagnosis and treatment of the individual cases are discussed by all members of the clinic who are concerned with the case.

(3) *Patients.*—Reference to the cancer clinic of all patients in whom the diagnosis or treatment of cancer is to be considered shall be either voluntary or obligatory in accordance with the vote of the medical staff or of the governing board of the hospital.

(4) *Equipment.*—In addition to the diagnostic and therapeutic surgical equipment which is required in every approved general hospital, there shall be available an apparatus for x-ray therapy of an effectiveness which is generally agreed upon as adequate, and an amount of radium sufficient to insure effective treatment.

(5) *Records.*—In addition to the records which are required in every approved general hospital, there shall be additional records of: (a) the details of the history and of the examination for cancer in different regions of the body, such as are indicated on the form records which are recommended by the Committee on the Treatment of Malignant Diseases, American College of Surgeons; (b) the details of the treatment by radium or x-ray as indicated on the form records which are recommended by the Committee on the Treatment of Malignant Diseases, American College of Surgeons; (c) periodic examinations at intervals for a period of at least five years following treatment.

(6) *Treatment.*—The treatment of cancer patients shall be entrusted to the members of the staff of the cancer clinic except in cases in which adequate treatment in accordance with the collective recommendations of the staff of the cancer clinic can be procured otherwise.

It does not take a lot of money to start such a cancer clinic. After the equipment has been purchased and set up, a systematic organization is necessary. The personnel should be trained in the detail working of the organization. It is important that trained men from all departments work in cooperation with each other. The cases are to be fully discussed from all angles and an agreement derived at whether surgery or irradiation is to be used in the treatment of a particular case. After the treatment has been decided upon and administered to the patient, it is very important that a thorough follow-up system be adopted. A social service worker is very necessary. She interviews each patient and gives him a card on which dates are marked for the return of the patient to the cancer clinic. Patients ordinarily return to the clinic every six weeks after treatment for the first year; every two or three months for the second year; every four or five months for the third year; every six months for the fourth year, and once each year after the fifth year. In this method of follow-up many recurrences will be found before the spread is far advanced and treatment properly given will often control it.

In my opinion, if such an outline is followed as above outlined, many more cancer patients will be cured and confidence restored by the public to consult their physician early and thus help us to reduce the appalling mortality in cancer.

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EDITORIAL DEPARTMENT

SOUTHERN MEDICAL ASSOCIATION
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BLOOD IODINE IN HYPERTHYROIDISM

Iodine is an intimate part of the molecule of thyroxin. Iodine deficiency is generally believed to be associated with goiter and cretinism. The relation of the blood iodine level to thyroid function is variously interpreted. In the majority of cases of hyperthyroidism, the blood iodine is high, but not in all cases. Perkin, Lahey and Cattell,[1] of Boston, have reinvestigated this subject and offered new ideas as to the interpretation of the blood iodine level in hyperthyroidism.

If iodine is administered to goitrous cases, they say, it generally brings about a temporary improvement during which it is possible for the patient to undergo operation. Histologically, an engorgement of the thyroid tissues occurs, with increase of their iodine content. The gland becomes firm and the lymph channels are obstructed, which perhaps temporarily interferes with secretion of thyroxin into the blood stream. If administration is continued, the symptomatic improvement is apt to recede, and it usually cannot be evoked again by the same therapy. For this reason iodine should be given only as preparation for surgery.

The Boston investigators established what they consider a normal value for blood iodine. The average amount was 6.6 gamma per one hundred c. c. (a gamma equals 0.001 milligram) and 10 gamma was taken as the upper limit of normal. More than two-thirds of their cases of hyperthyroidism gave high blood iodine values. About 30 per cent of patients with clinical and microscopic hyperthyroidism, however, had normal iodine levels. In early hyperthyroidism, it has been noted, there is usually an excess of iodine in the blood and considerable quantities are lost in the urine. Their hyperthyroids with normal blood iodine were frequently the severe late cases, many of which required two-stage operations. A large number of these had had repeated iodine treatment before hospitalization. A normal blood iodine with clinical hyperthyroidism thus seemed to be a rather unfavorable sign, suggestive of a state of intense intoxication.

An iodine tolerance test is proposed by Perkin, Lahey and Cattell as a means of aiding in the differential diagnosis of hyperthyroidism. The patient is given 37.5 milligrams of iodine as Lugol's solution, by mouth, and blood samples are examined at half-hour intervals, before dosage and for a period thereafter, as in the sugar tolerance test. The iodine curve of normal persons is high; that is, the blood iodine rises quickly to a high level. The elevation is much less in hyperthyroids. Iodine tolerance appeared to be great in intense thyroid intoxication. In the non-toxic goiters and in the adolescent goiters tested, the blood iodine curve rose as in normals. The investigators suggest that the tolerance test may prove to be valuable in differentiating toxic from non-toxic cases, and in establishing the diagnosis of hyperthyroidism.

1. Perkin, H. J.; Lahey, Frank H.; and Cattell, Richard B.: Blood Iodine Studies in Relation to Thyroid Disease. Basic Concept of the Relation of Iodine to the Thyroid Gland: An Iodine Tolerance Test. New Eng. Jour. Med., **214**:45 (Jan. 9), 1936.

EFFECTS UPON BOYS OF LARGE DOSES OF GONADOTROPIC HORMONE

In cases of undescended testicle, a recently discovered medical treatment seems to be so effective as to bid fair to supplant the operative measures which were formerly employed. Anterior pituitary-like sex hormone of pregnancy urine, if given in doses of 250 rat units from three to five times per week over a period

of months, according to Dorff[1] and others, usually brings about complete descent and normal development of the testicle. Occasionally, in cases of slow response, from 500 to 1,000 c. c. were given daily for a period. The largest total dose reported by Dorff in a series of eleven cases was 46,266 rat units, which were administered over a period of thirteen months. This author has attempted to analyze the results of this prolonged and intensive treatment, and to note possible development of unfavorable symptoms.

The reactions which formerly followed the injections, such as fever, vomiting and lassitude, he says, have been eliminated since the purification of the product. The response of the testes was more marked as the patient approached puberty. Occasionally a genital development in advance of the child's age, however, could be stimulated. The height of the boys before treatment was usually above normal. During therapy either by the thyroid or by the gonadotropic hormone, the height increment became still greater. The patients were obese from the start, with the girdle type of obesity, mammary enlargement and abdomen padded with fat. The overweight persisted after complete correction of the maldescent of the testicle, though there was some change in the distribution of the fatty pads. The relationship of the gonads to obesity was therefore questioned. There was some genu valgum, which tended to improve under treatment. No further enlargement of the breasts occurred during A.P.L. injections; a nodule of the breast was detected in only one patient; it receded and was believed to be coincidental. In view of the frequency of breast tumors in rabbits after injections of pregnancy urine, the breasts of patients under A.P.L. treatment should be carefully examined. Several of the boys showed traces of albuminuria during the injections, but no gross evidence of renal damage. There was no clear evidence that A.P.L. stimulated the thyroid gland, but retarded osseous development was not further depressed. The boys became possibly mentally more alert and more assertive.

1. Dorff, G. B.: Maldevelopment and Maldescent of the Testes: Further Observations on Treatment with the Anterior Pituitary-Like Gonadotropic Hormone. Amer. Jour. Dis. Child., **50**:1429 (Dec.), 1935.

GLEANINGS FROM RECENT JOURNALS

A Muscular Hypertrophy of Infants.—A syndrome in which infant muscles enlarge to resemble those of a prize fighter, showing sometimes paroxysmal contractions, the child having also a thickened skin, enlarged tongue and flat nose, with mental deficiency and characteristic lesions of the brain and central nervous system has been described. The condition has usually been fatal. Debre and Semelaigne,[1] of Paris, have noted patients of this type, in one of whom the diagnosis of hypothyroidism was suggested. Upon thyroid therapy the muscular hypertonia decreased, the face became normal, the weight and height of the infant increased, and normal development began. The patient lived. After reexamination of their own and other cases reported, the French authors conclude that this syndrome is one of the manifestations of cretinism or congenital athyroidism, which is amenable to specific therapy.

Salt and the Skin.—Skin irritation, wheals, eczema and eruptions may be produced in a wide variety of ways. A small amount of sunlight acting on the skin of a patient whose diet has lacked vitamin G can cause a dermatitis like that of pellagra.[2] According to Keining and Hopf,[3] of Hamburg University, ordinary table salt may increase the irritability or responsivity of the skin, so that its reaction to ultraviolet light is increased. If the individual is given a salt-free ration for a few days, then instead of sodium chloride a salt mixture containing sodium, potassium and magnesium in the relative concentrations in which they exist in the blood, the erythema of radiation is decreased. More than half of a series of 1,500 patients with urticaria and eczema were reported as improved after substitution of the mixed salts for sodium chloride. The sodium ion was considered more harmful than the chlorine.

It is easy to believe that the average individual may consume more sodium chloride than he needs. A salt substitution treatment is sufficiently simple and harmless to make it worth trying. The idea is of course not particularly

1. Debre, R.; and Semelaigne, G.: Syndrome of Diffuse Muscular Hypertrophy in Infants Causing Athletic Appearance: Its Connection with Congenital Myxedema. Amer. Jour. Dis. Child., **50**:1351 (Dec.), 1935.

2. Editorial, Pellagra and Pernicious Anemia. Sou. Med. Jour., **27**:467, 1934.

3. Keining, E.; and Hopf, G.: Injurious Effects of Sodium Chloride and Their Prevention. Arch. Dermat. & Syph., **32**: 739 (Nov.), 1935.

new, though it is perhaps worked out with a new formula. The use of sea water concentrate instead of pure sodium chloride has been popular in some circles, particularly among vegetarians, for a number of years.

Incubation Period of Neurosyphilis: Effect of Incomplete Treatment.—According to Kemp and Menninger,[1] early inadequate treatment of syphilis does not increase the likelihood of neurosyphilis; but it reduces the incubation period. Neurosyphilis comes on five years earlier among the inadequately treated than among the entirely untreated.

TWENTY-FIVE YEARS AGO

FROM JOURNALS OF 1911

Responsibility for Typhoid Fever.[2]—"The Supreme Court of Minnesota holds, in an opinion filed December 23, 1910, in the cases of Delia Keever and Kate Flannagan, each as administratrix, against the City of Mankato, that the municipality was liable for its negligence in its private or corporate capacity, if it negligently allowed the water supply in its waterworks system to become polluted, causing deaths from typhoid fever."

Ehrlich's 606.[3]—"In September Dr. Simon Flexner, of the Rockefeller Institute, sent us a supply of Ehrlich's salvarsan (606) to be used for experimental purposes. The cases that we have selected for treatment with this remedy belong to unusual types and to those rebellious to the usual methods of treatment. * * *

"* * * The patient was given 0.6 gm. of salvarsan under the left scapula according to Wechselmann's method. Considerable pain followed, lasting about twelve hours. The next day the site of the injection was infiltrated, slightly painful, and presented a tumefaction 4 inches in diameter.

"Four days later the ulceration in the nose had healed entirely and the ones on forearm and leg showed marked improvement. * * *

"The Wassermann reaction * * * was negative, and all of the lesions had entirely healed and the patient's condition was wonderfully improved. November 15 he was discharged from the hospital apparently cured. * * *

"To be perfectly fair, except in Case 2, * * * we have seen equally as rapid disappearance of skin manifestations from the use of injections of mercury. * * *"

606.[4]—"Indications at present are very strong that we are on the verge of a period of indiscriminate and reckless use of Ehrlich's new remedy, 606, or salvarsan, as it is known commercially, that will result in disappointment in that valuable remedy—and what is more important — in damage to many syphilitic patients, chiefly, let us hope from neglect of established measures of treatment. Indeed, it will be very fortunate if we do not have another therapeutic fiasco like that following the announcement of Koch's tuberculin, in which a valuable remedy failed to come up to first expectations. * * * For in the excitement over 606 we are apparently remembering only that it was introduced to cure syphilis, and are therefore assuming that it will cure it, and are not taking heed of the fact that experience already is showing that it is not doing it."

606 in England.[5]—"As in all civilized countries, salvarsan, or 606, has become a burning topic, not only in the profession, but in lay circles. * * * McDonagh, surgeon to the London Lock Hospital * * * endorses all the claims made by Ehrlich. In all stages of syphilis rapid recovery followed a single injection. He has treated 130 cases, in only three of which recurrence took place, two of these patients being cured by a second injection. Lichen syphiliticus, which is most resistant to mercury, was cured by a single injection. Malignant syphilis associated with tuberculosis was improved beyond recognition. In nerve paralysis from syphilitic meningitis almost complete power of the muscles was regained. In one case of tabes the Argyll Robertson pupils disappeared and the knee jerks returned. * * * General paralysis in the early stage improved considerably.

"On the other hand, Mr. Ernest Lane * * * declares that his results have been no better than * * * from mercury. One patient with syphilitic ulceration improved temporarily, but soon relapsed; another injection was followed again by improvement and another relapse, the ulcer spreading to twice its former size."

Treatment of Pellagra.[6]—"The hexamethylenamin treatment was tried by me * * * because of the probability of pellagra being an infectious disease. * * * Two of the cases were so severe that it looked as if death would be the only outcome, while the other three cases were of moderate severity. Such prompt and striking improvement followed the administration of hexamethylenamin that although the number of cases in which it was used is very small I feel that it deserves a more extensive trial."

1. Kemp, J. E.; and Menninger, W. C.: The Influence of Inadequate Treatment of Early Syphilis on the Incidence and Incubation Period of Neurosyphilis. Bull. Johns Hop. Hosp., **58**:24, Jan., 1936.

2. Medicolegal. J.A.M.A., **56**:65, 1911.

3. Engman, M. F.; Mook, W. H.; and Marchildon, J. W.: Report on Sixteen Syphilitic Patients Treated with Ehrlich's Salvarsan (606). Ibid, p. 87.

4. Pusey, William Allen: The Situation as Regards Salvarsan (606). Ibid, p. 119.

5. London Letter. Ibid, p. 130.

6. Tucker, Beverley R.: Pellagra, with the Analytical Study of Fifty-Five Non-Institutional or Sporadic Cases. Ibid, p. 246.

Correspondence

ALLERGIC OCULAR MANIFESTATIONS

Editor, SOUTHERN MEDICAL JOURNAL:

In a recent issue of your esteemed JOURNAL (volume 28, page 1013, November 1935) there is an incorrect quotation from an article by me which I think needs correction. Dr. Meyer Wiener quotes me as saying that a needling operation on the right eye was followed by swelling of the lens in the left eye. This was not the case. The swelling of the lens in the second eye did not occur until some months later and then followed a lens sensitization test.

ROBERT H. COURTNEY, M.D.

Richmond, Virginia, January 14, 1936.

Book Reviews

Prescription Writing and Formulary: the Art of Prescribing. By Charles Solomon, M.D., Assistant Clinical Professor of Medicine, Long Island College of Medicine; Associate Attending Physician and Chief of the Medical Clinic, Jewish Hospital of Brooklyn; Lecturer in Materia Medica, Nurses' Training School, Jewish Hospital, with a foreword by Lewellys F. Barker, M.D. 351 pages, illustrated. Philadelphia: J. B. Lippincott Company, 1935. Cloth, $4.00.

Dr. Solomon has written a book which should be very beneficial in every day practice. His advice and prescriptions are intensely practical. In the first part he outlines the history of prescription writing, compares costs between the use of the U.S.P. drugs and those of proprietary origin and the methods of administering drugs. In the second part the writer states his reasons for preferring Latin rather than English in the writing of prescriptions, gives dosages and methods. The third section contains a group of prescriptions that the author uses. This book is heartily recommended.

The Stomach and Duodenum. By George B. Eusterman, M.D., F.A.C.P., Head of Section in Division of Medicine, The Mayo Clinic; Professor of Medicine, The Mayo Foundation for Medical Education and Research, Graduate School, University of Minnesota; and Donald C. Balfour, M.B., M.D. (Tor.), LL.D., F.A.C.S., F.R.A.C.S., Head of Section in Division of Surgery, The Mayo Clinic, Professor of Surgery, The Mayo Foundation for Medical Education and Research, Graduate School, University of Minnesota; and Members of the Staff, The Mayo Clinic and The Mayo Foundation for Medical Education and Research, Graduate School, University of Minnesota. 958 pages, illustrated. Philadelphia: W. B. Saunders Co., 1935. Cloth, $10.00.

The time is propitious for the publication of a comprehensive treatise on diseases of the stomach and duodenum in which the medical and surgical phases are considered together. Eusterman, an eminent gastro-enterologist, and Balfour, a great surgeon, with the collaboration of their colleagues in the Mayo Clinic, have prepared a treatise on "The Stomach and Duodenum" that fulfills the desire of practitioners of medicine and surgery for a concise and comprehensive compilation of the newer knowledge of diseases of the stomach and duodenum.

It will not be possible to review the 63 chapters, all of which contain valuable and interesting data in this comprehensive treatise on gastric and duodenal diseases; but mention will be made of a few of the subjects discussed. Wilbur, in the chapter on the history of diseases of the stomach, brings out our debt to the surgeons, particularly Lord Berkley Moynihan and W. J. and C. H. Mayo, for much of our present knowledge of peptic ulcer, an opinion that is concurred in by thoughtful students of gastro-enterology. He fails, however, to give credit to Lenhartz for his great contribution to the treatment of gastric and duodenal ulcers when in 1904 he began to feed ulcer patients every hour. Practically all of the many diets for ulcer, bearing the name of a gastro-enterologist or internist, including the Sippy diet, are modifications of, but all are not improvements on, the original Lenhartz diet. Wilbur rightly gives Sippy credit for popularizing the medical treatment of gastric and duodenal ulcers. He adds: "More recent years have seen a tendency to get away from heavy alkalinization of patients with ulcer."

Alvarez contributes an excellent chapter on "Applied Physiology of the Stomach and Duodenum." Mann's account of researches in producing ulcer experimentally shows how our knowledge of ulcer has been advanced by laboratory investigations. MacCarty's resumé of his studies of 4,129 gastric and 1,589 duodenal specimens surgically removed in the Mayo Clinic from 1889 to 1933, presents some interesting facts; though others of large clinical experience will not agree with him in his conclusion that "carcinoma is the most frequent gastric lesion," nor will they agree that "it (carcinoma of the stomach) is one of the most readily diagnosed cancers." Most clinicians deplore the fact that an early diagnosis of cancer of the stomach at a time when surgery offers the only hope of a cure, is often extremely difficult, impossible at times, except by an abdominal exploration. MacCarty states that 10 to 15 per cent of gastric ulcers present histological evidences of cancer, a very considerable reduction from his former estimates of the transition from gastric ulcer to cancer.

Eusterman's chapters on dyspepsia, the examination of the patient, test meals and significance of symptoms are orthodox and are very well presented. The chapter on roentgenologic diagnosis by Kirlin is beautifully illustrated and summarizes clearly the technic of studying the various lesions of the stomach and duodenum.

Duodenal and gastric ulcers are fully discussed from the medical, and particularly the surgical, viewpoint. Eusterman estimates that 90 per cent of peptic ulcers are of the duodenum, in which the treatment is largely medical; except when there is perforation, pyloric obstruction, or when repeated efforts to cure the patient medically have failed. Eusterman employs a modified Sippy treatment. He "damns with faint praise," and brief mention, the non-specific protein therapy ("shots") and mucin in duodenal ulcer.

Balfour's chapters on the surgical treatment of duodenal and gastric ulcers and carcinoma of the stomach are masterpieces, with many illustrations. Perhaps the technic of gastric surgery has never been better described than by Balfour. Eusterman's discussion of gastric syphilis is a valuable contribution to the volume. Gastritis, duodenitis, cardiospasm and pylorospasm and other disorders of the stomach and duodenum are given proper consideration.

The medical profession should be grateful to Eusterman and Balfour, and their colleagues, for their interpretation, or their evaluation, of the varied and extensive laboratory and clinical studies on the stomach and duodenum that have been made in the last two or three decades. They coordinate the knowledge gained from the study of gastric and duodenal diseases by physiologists, pathologists, roentgenologists and clinicians all over the world, and present the data in language that can be comprehended by the general practitioner. Eusterman and Balfour's book is one that gastro-enterologists, internists and surgeons and men in general practice may use with profit for many years for the study of the disorders of the mid portion of the alimentary tract.

The Bacteriology of Typhoid Salmonella and Dysentery Infections and Carrier States. By Leon C. Havens, M.D., Late Director of Laboratories, Alabama Department of Public Health. Edited by Kenneth F. Maxcy, M.D., Professor of Preventive Medicine and Bacteriology, University of Virginia. Foreword by Wilson G. Smillie, M.D., Professor of Public Health Administration, Harvard University. 158 pages. New York, N. Y.: Commonwealth Fund, 1935. Cloth, $1.75.

This book is intended as a practical guide for bacteriologists and technicians in the isolation and identification of intestinal bacteria; and as such, presents a comprehensive discussion of the bacteriology of the typhoid-salmonella-dysentery group of organisms with the necessary detailed bacteriological methods.

The clear, easy style of writing and logical development of the subject make it very interesting reading. Following a short but pointed general discussion of the problem, the author gives an excellent resumé of the antigenic composition of the bacterial cell and bacterial variation. Culture media for preservation of the specimen, and for isolation and identification are described together with experimental data on six preserving media. Technical procedures for cultural identification are described in detail. A separate chapter is devoted to serological methods and technic.

The remaining two-thirds of the book is devoted to chapters on typhoid fever, the typhoid carrier problem, the salmonella group, and bacillary dysentery. Laboratory methods of diagnosis follow the description of each of these groups of organisms.

Undue emphasis has perhaps been placed on the value of brilliant green and lithium chlorine media in the preservation of specimens; the evaluation of these media should be questioned until further work shows general confirmation.

The author writes with the authority of one thoroughly familiar with intestinal bacteriology through years of experience. The wealth of information contained in this book makes it valuable to any bacteriologist.

The Treatment of Diabetes Mellitus. By Elliot P. Joslin, M.D. (Harvard), M.A. (Yale) Medical Director, George F. Baker Clinic, New England Deaconess Hospital; Clinical Professor of Medicine, Harvard Medical School, with the cooperation of Howard F. Root, M.D., Priscilla White, M.D., Alexander Marble, M.D. Fifth Edition, Revised and Rewritten. Illustrated. Philadelphia: Lea & Febiger, 1935.

The fifth edition (1935) of Joslin's "Treatment of Diabetes" contains more authentic information regarding diabetes than has ever before been recorded in one volume. It is a concise and thorough revision of the fourth edition, with much additional data, but expressed in several hundred fewer pages than in Joslin's former monumental monograph on diabetes. Instead of a revision it might be said that Joslin has given the medical profession a new book on diabetes, in which he has had as collaborators his associates who have been trained by the master diabetic clinician. Priscilla White's studies on heredity seem to have proven that the Mendelian law applies in diabetes, and she has become a recognized authority on diabetes in childhood and in pregnancy, subjects which she discusses in Joslin's new book. Howard Root has written chapters on cardiovascular diseases and tuberculosis as complications of diabetes. Root's chapters on diabetic surgery are also a valuable contribution to the practical management of diabetes. Alexander Marble and Hazel Hunt have collaborated with Joslin in the important chapter on the physiology of diabetes; and Marble contributed the chapters on coma, and cancer as a complication of diabetes. Shields Warren collaborated with Joslin and Root on diabetic pathology. Jordan, now of Richmond, Virginia, and Root revised the chapter on the nervous system in diabetes. The entire field of diabetes has been covered, largely by Joslin himself, and few books on any disease have been written that are so complete as this revision.

Laboratory Methods of the United States Army. Fourth Edition. Edited by James Stevens Simmons, B.S., M.D., Ph.D., Major, Medical Corps, United States Army; Director of Laboratories, Army Medical Center. Associate Editor, Cleon J. Gentzkow, M.D., Ph.D., Major, Medical Corps, United States Army; Chief of the Division of Chemistry, Army Medical School. 1091 pages, illustrated. Philadelphia: Lea & Febiger, 1935. Limp binding, $6.50.

This manual, known originally as War Manual No. 6, has now had its fourth revision, the second under the present title. It is designed for army diagnostic laboratories and as a teaching manual for the Army Medical School. For this reason such tests as the Wassermann and Kahn are given in full detail. Most of the book has been rewritten. The sections on protozoology, helminthology and entomology have been enlarged. The added sections are on rickettsia, the filterable viruses and statistical methods. The contributors are outstanding members of the Medical, Veterinary, Dental and Medical Administrative Corps of the Army and Public Health Service. This book is well adapted for routine laboratory work, although in some instances the technician will be limited to a single laboratory method.

Growing Superior Children. By I. Newton Kugelmass, M.D., Ph.D., Sc.D., Attending Pediatrician of the Broad Street Hospital, French Hospital and Heckscher Institute, New York. 568 pages, illustrated. New York: D. Appleton - Century Company, 1935. Cloth, $3.50.

This is another of the many books written for parental guidance in the rearing of children. The advice given is sound and is expressed in simple, understandable language. The author devotes a large part of the text to habit training and mental development, including emotional health. This part is well done and can be read with profit by all who have the responsibility of training children.

Medical Record Visiting List (1936).—Dated or undated, black or red binding: 30 patients per week, $1.75; 60 patients per week, $2.00; 90 patients per week, $2.50. Baltimore: The Williams & Wilkins Co.

This familiar visiting list has been in use for a number of years. There are no changes in this edition. It provides a satisfactory method for the physician to keep account of his work.

Immunology. By Noble Pierce Sherwood, Ph.D., M.D., Professor of Bacteriology, University of Kansas, and Pathologist to the Lawrence Memorial Hospital, Lawrence, Kansas. 608 pages, illustrated. St. Louis: The C. V. Mosby Company, 1935. Price, $6.00.

The author has written an excellent book on the underlying principles involved in infections, resistance, and diagnostic laboratory procedures. The teachings of physiology, pharmacology, organic, biological and physical chemistry, as well as anatomy, pathology and general biology have been correlated and applied to immunology. While written primarily for students of medicine, the book will prove of value to students of the related sciences.

Definitions are freely given, a separate chapter on the fundamentals of colloids is included, standard technics are analyzed and discussed. Considerable emphasis has been placed on the subject of specificity, and appropriate space has been given to bacterial antigens, modified antigens, serological tests in syphilis, hypersensitiveness, and allergy. While some of the material presented is necessarily condensed, this does not detract from the value of a book as a test. The author has drawn extensively from various publications and the current literature and furnishes a really excellent bibliography.

Chinese Medicine. By William R. Morse, M.D., LL.D., F.A.C.S., Dean of Medical School, Head of Department of Anatomy and Associate in Surgery, West China Union University, College of Medicine and Dentistry, Chengtu, Szechwan Province, West China. 185 pages, illustrated. New York: Paul B. Hoeber, Inc., 1934. Cloth, $1.50.

Japanese Medicine. By Y. Fujikawa, M.D. Translated from the German by John Ruhrah, M.D., with a chapter on the Recent History of Medicine in Japan by Kageyas W. Amano, M.D., Ds.C. (Med.). 114 pages, illustrated. New York: Paul B. Hoeber, Inc., 1934. Cloth, $1.50.

German Medicine. By W. Haberling, M.D., Professor of the History of Medicine, Academy of Dusseldorf; Translated by Jules Freund, M.D., Ex-Associate in Bacteriology, University of Pennsylvania. 150 pages, illustrated. New York: Paul B. Hoeber, Inc., 1934. Cloth, $1.50.

French Medicine. By M. Laignel-Lavastine, Professor in the Medical Faculty in Paris, Secretary General of the International Society of Medical History, and M. Raymond Molinery, Gold Medalist of the Academy of Medicine, Member of the French Society of Medical History. Translated by E. B. Krumbhaar, M. D.; Professor of Pathology, University of Pennsylvania. 187 pages, illustrated. New York: Paul B. Hoeber, Inc., 1935. Cloth, $2.50.

Medicine in Persia. By Cyril Elgood, M.D., M.R.C.P., Late Physician to the British Legation, Teheran, Persia. 105 pages, illustrated. New York: Paul B. Hoeber, Inc., 1934. Cloth, $1.50.

These primers offer a means of reading history at odd times, as they are small and can be carried in the pocket. While not giving the wealth of detail that is found in larger volumes, they enable the reader to gain a view of medical trends in certain countries and sections from their beginnings.

Many passages will catch the fancy, as does the description of acupuncture with charts in the Chinese text. The Japanese primer is a little difficult to peruse, because of the average reader's unfamiliarity with the names. It gives the Chinese credit for their early medical teachings and describes the German influences in more modern times. Naturally the book on Germany is replete with great names and gives special attention to chemotherapy. The description of the ancient medical faculties and their privileges in early France are interesting. To the reader the mystery of Persia and reproductions from its early anatomies and medical books are outstanding. Any physician devoting a few minutes to these books can gain an understanding of medical history that will form an important background for his work.

Southern Medical News

DALLAS SOUTHERN CLINICAL SOCIETY

The Dallas Southern Clinical Society will hold its eighth annual clinical conference at Dallas, Texas, March 16-19, at the Baker Hotel. Lectures, clinics, clinical conferences and round table luncheons held daily. Dr. David W. Carter, Jr., is President, Dr. Curtice Rosser is Chairman Executive Committee, Dr. Henry M. Winans is Director of Clinics, and Dr. Jo C. Alexander, 1414 Medical Arts Building, Dallas, Texas, is Secretary.

MID-SOUTH POSTGRADUATE MEDICAL ASSEMBLY

The Mid-South Postgraduate Medical Assembly, fifty-second annual meeting, will be held at Memphis, Tennessee, Tuesday, Wednesday, Thursday and Friday, February 11, 12, 13, 14, at the Hotel Peabody. Clinical lectures and round table discussions each day. Dr. A. F. Cooper, Goodwyn Institute Building, Memphis, Tennessee, is Secretary.

SOUTHEASTERN SURGICAL CONGRESS

Southeastern Surgical Congress, membership made up of surgeons of Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee and Virginia, will hold its seventh annual assembly at New Orleans, Louisiana, Monday, Tuesday and Wednesday, March 9, 10, 11, at the Roosevelt Hotel. Clinical and round table discussions will be conducted daily. The annual banquet will be on Tuesday evening. Dr. William D. Haggard, Nashville, Tennessee, is President, and Dr. B. T. Beasley, Doctors Building, Atlanta, Georgia, is Secretary.

ALABAMA

Dr. Samuel W. Shelton, Guin, was recently appointed Health Officer of Winston County.

Dr. George E. Newton, Fayette, has been appointed Health Officer of Jackson County, succeeding Dr. Edward A. Thorne, resigned.

Dr. John H. Musser, Professor of Medicine, Tulane University School of Medicine, New Orleans, Louisiana, recently lectured at the University of Alabama.

The Mobile County Medical Society had as guest speaker at a recent meeting Dr. M. A. Lischkoff, Pensacola, Florida.

Dr. Reuben J. Guest, Fort Payne, and Miss Janie Chapman were married recently.

DEATHS

Dr. Emory Arnold Morris, Birmingham, aged 56, died December 7 of acute coronary occlusion.

ARKANSAS

The Crawford County Medical Society has elected the following officers for the coming year: Dr. B. B. Bruce, Alma, President; Dr. J. A. Wigley, Mulberry, Vice-President; Dr. L. G. Young, Van Buren, Secretary-Treasurer.

The Independence County Medical Society has elected the following officers for the coming year: Dr. P. H. Jeffery, Bethesda, President; Dr. F. A. Gray, Batesville, Vice-President; Dr. M. S. Craig, Batesville, Secretary-Treasurer.

The Washington County Medical Society has elected the following officers for the coming year: Dr. H. D. Wood, Fayetteville, President; Dr. F. R. Morrow, Fayetteville, Vice-President; Dr. Fount Richardson, Fayetteville, Secretary-Treasurer.

The Lawrence County Medical Society elected the following officers for the coming year: Dr. T. C. Guthrie, Smithville, President; Dr. W. W. Brown, Williford, Vice President; Dr. G. S. Atkinson, Hardy, Secretary-Treasurer.

The Drew County Medical Society has elected the following officers for the coming year: Dr. A. S. J. Collins, Monticello, President; Dr. J. P. Price, Little Rock, Vice-President; Dr. J. S. Wilson, Monticello, Secretary-Treasurer.

The Sixth Councilor District Medical Society elected the following officers for the coming year: Dr. C. A. Archer, DeQueen, President; Dr. H. E. Longino, Texarkana, Vice-President; Dr. R. R. Robins, Texarkana, Secretary-Treasurer.

The Ouachita County Medical Society elected the following officers for the coming year: Dr. J. P. Clemens, Mt. Holly, President; Dr. E. J. Byrd, Bearden, Vice-President; Dr. R. B. Robins, Camden, Secretary.

The Union County Medical Society has elected the following officers for the coming year: Dr. A. D. Cathey, El Dorado, President; Dr. J. B. Wharton, El Dorado, Vice-President; Dr. B. L. Moore, El Dorado, Secretary-Treasurer.

The Saline County Medical Society elected the following officers for the coming year: Dr. T. C. Watson, Benton, President; Dr. D. W. Fulmer, Dierks, Vice-President; Dr. C. W. Jones, Benton, Secretary-Treasurer.

The Jefferson County Medical Society has elected the following officers for the coming year: Dr. Virgil L. Payne, Pine Bluff, President; Dr. C. J. Higinbotham, Pine Bluff, Vice-President; Dr. R. E. Maynard, Secretary-Treasurer.

The Pulaski County Medical Society has elected the following officers for the coming year: Dr. M. J. Kilbury, Little Rock, President; Dr. R. M. Blakely, Little Rock, Vice President; Dr. E. H. White, Little Rock, Secretary; Dr. R. J. Calcote, Little Rock, Treasurer.

The Mississippi County Medical Society has elected the following officers for the coming year: Dr. W. M. Owen, Armorel, President; Dr. T. F. Hudson, Luxora, Vice-President; Dr. F. D. Smith, Blytheville, Secretary-Treasurer.

The Sebastian County Medical Society has elected the following officers for the coming year: Dr. M. E. Foster, Fort Smith, President; Dr. W. G. Eberle, Fort Smith, Vice-President; Dr. L. M. Henry, Fort Smith, Secretary; Dr. W. R. Brooksher, Fort Smith, Treasurer.

Dr. C. W. Dixon, Gould, was recently made a member of the Lincoln County Farm Adjustment Board.

The Craighead-Poinsett County Medical Society had as guest speakers at a recent meeting Dr. R. H. Klemme, St. Louis, Missouri, and Dr. B. F. Turner, Memphis, Tennessee.

The Benton County Medical Society had as guest speaker at its meeting on November 14 Dr. George E. Knappenberger, Kansas City, Missouri.

Dr. Alfred Hathcock, Fayetteville, has returned after spending some time in St. Louis, Missouri, doing postgraduate work.

Dr. J. B. Crawford and Dr. S. R. Crawford, formerly of Little Rock, have moved to El Dorado.

Dr. L. L. Purifoy, El Dorado, now has associated with him Dr. R. E. Pryor, formerly of Little Rock.

Dr. J. M. Taylor, formerly of Fort Smith, has moved to Mena to take charge of the Mena Hospital.

Dr. C. D. Winborn, formerly of El Dorado, has moved to Minneapolis, Minnesota.

Dr. A. B. Jemison, formerly of Morrilton, has moved to Biloxi, Mississippi.

Dr. E. M. Gray, formerly of Mountain Home, has moved to Evening Shade.

Dr. O. G. Blackwell, Pine Bluff, and Mrs. Mildred Buck Seynard were married December 4.

Deaths

Dr. Thomas B. Hutto, Damascus, aged 55, died recently.

Dr. Andrew J. Clingan, DeQueen, aged 67, died November 29 of hepatic cirrhosis.

Dr. Laburn Hall, Turner, aged 79, died November 27 of cerebral hemorrhage.

Dr. Edgar Tolman Ponder, Little Rock, aged 50, died December 7 of bronchopneumonia.

DISTRICT OF COLUMBIA

The Medical Society of the District of Columbia had as guest speaker at the meeting on January 29 Dr. Louis A. Buie, Rochester, Minnesota.

Dr. Russell L. Haden, Cleveland, Ohio, was a guest speaker before the meeting of the Naval Medical Officers at the Naval Medical School December 2.

Deaths

Dr. James Hall Bell, Washington, aged 78, died November 10 of pulmonary edema.

Dr. Victor H. Esch, Washington, aged 63, died December 8 of cerebral hemorrhage and arteriosclerosis.

FLORIDA

The Dade County Medical Society elected the following officers for the coming year: Dr. John E. Hall, Miami, President; Dr. Harrison A. Walker, Miami Beach, Vice-President; Dr. M. E. Threlkeld, Miami, Secretary; Dr. H. A. Barge, Miami, Treasurer.

The Duval County Medical Society elected the following officers for the coming year: Dr. W. M. Shaw, Jacksonville, President; Dr. Kenneth Morris, Jacksonville, President-Elect; Dr. Charles Mabry, Jacksonville, Vice-President; Dr. H. W. Porter, Jacksonville, Secretary; Dr. John W. Hayes, Jacksonville, Treasurer.

The Leon-Gadsden-Liberty-Wakulla-Jefferson Counties Medical Society elected the following officers for the coming year: Dr. R. F. Godard, Quincy, President; Dr. J. M. Beggs, Chattahoochee, Vice-President; Dr. B. A. Wilkinson, Tallahassee, Secretary-Treasurer.

Dr. Frank V. Chappell, formerly of Madison, was recently appointed Health Officer of the Jacksonville district.

Dr. Paul G. Shell, Marianna, has been placed in charge of a new health unit in Jackson County.

Dr. Thomas H. D. Griffitts, Jacksonville, has been elected President of the Florida Public Health Association.

Dr. Wilbur A. McPhaul, Pensacola, has been appointed State Health Officer.

The Florida Public Health Association had as guest speaker at the meeting on December 2 Dr. W. W. Bauer, Chicago, Illinois.

Dr. A. E. Drexel, Palatka, has returned after taking postgraduate work in New York City.

Dr. Duncan McEwan, Orlando, and Miss Marion Friess were married recently.

Dr. John C. Adams and Miss Lucene Prestwood, both of Pensacola, were married recently.

Dr. Rayburn Nelson Joyner and Miss Olive Marie Rigdon, both of Jacksonville, were married November 7.

Dr. Henry Hansford Ward, Sumatra, and Miss Edith Rebecca Nall were married October 5.

Deaths

Dr. Edgar Stuart Estes, St. Augustine, aged 56, died December 6 of heart disease.

Dr. Philip Elington Milton, Tampa, aged 61, died November 25.

Dr. Charles Henry Glidden, Fort Pierce, aged 82, died November 21 of cardiorenal disease.

Dr. J. Blake White, Daytona Beach, aged 86, died November 4.

GEORGIA

The Bartow County Medical Society has elected the following officers for the coming year: Dr. W. E. Wofford, Cartersville, President; Dr. J. W. Stanford, Cartersville, Vice-President.

The Jackson Barrow Counties Medical Society has elected the following officers for the coming year: Dr. C. B. Lord, Jefferson, President; Dr. C. B. Almand, Winder, Vice-President; Dr. J. T. Stovall, Jefferson, Secretary-Treasurer.

The Macon Medical Society elected the following officers for the coming year: Dr. Ernest Corn, Macon, President; Dr. Wallace L. Bazemore, Macon, President-Elect; Dr. John I. Hall, Macon, Vice-President; Dr. Willard R. Golsan, Macon, Secretary-Treasurer.

The Ware County Medical Society elected the following officers for the coming year: Dr. R. L. Johnson, Waycross, President; Dr. W. L. Pomeroy, Waycross, Vice-President; Dr. K. McCullough, Waycross, Secretary-Treasurer.

The Troup County Medical Society elected the following officers for the coming year: Dr. R. S. O'Neal, LaGrange, President; Dr. Cal Morgan, West Point, Vice-President; Dr. J. S. Holder, LaGrange, Secretary-Treasurer.

Dr. Charles A. Greer, Oglethorpe, has been elected Secretary of the Ware County Medical Society for life.

Dr. R. H. Oppenheimer, Emory University, has been elected Vice-President of the Association of American Medical Colleges.

Dr. Thomas J. Ferrell, Waycross, has been elected to Fellowship in the American College of Surgeons.

Dr. Charles W. Folsom, formerly with the United States Public Health Service, was recently made Commissioner of Health of Walker County, succeeding Dr. Samuel P. Hall, Jr., resigned.

Continued on page 26

DOCTOR . . .

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DR. EMIL NOVAK, Assoc. Prof. of Obst., Univ. of Md., Baltimore, Md.
DR. I. S. WECHSLER, Prof. Clin. Neur., Columbia Univ., Coll. of Phys. & Surg., New York
DR. R. H. JAFFE, Prof. Path., Rush Med. Coll., Univ. of Chicago, Chicago, Ill.
DR. CLAUDE S. BECK, Assoc. Prof. Surg., Western Reserve Univ., Cleveland, Ohio
DR. C. R. STRAATSMA, Assoc. in Otolaryn. & Surg., Columbia Univ., New York
DR. W. C. ALVAREZ, Assoc. Prof. Med., Univ. of Minn., Grad. Sch. Med., Rochester, Minn.
DR. HARLOW BROOKS, Prof. Emer. Clin. Med., New York Univ., New York, N. Y.
DR. CONRAD BERENS, Ophth. Surg. & Pathologist, New York Eye and Ear Infirmary, New York
DR. E. M. LANDIS, Ass't. Prof. Med., Univ. of Penn., Philadelphia, Pa.
DR. JOHN T. MURPHY, Toledo, Ohio
DR. K. D. BLACKFAN, Prof. of Ped., Harvard Univ., Boston, Mass.
DR. GILBERT J. THOMAS, Ass't. Prof. Urol., Univ. of Minn., Minneapolis, Minn.
DR. DAVID L. FARLEY, Ass't. Prof. Med., Univ. of Penn., Philadelphia, Pa.
DR. JOSEPHINE B. NEAL, Clin. Prof. Neur., Columbia Univ., New York, N. Y.
DR. FRANK H. LAHEY, Boston, Mass.
DR. H. M. TAYLOR, Jacksonville, Fla.
DR. NORMAN F. MILLER, Prof. Obst. & Gyn., Univ. of Mich., Ann Arbor, Mich.
DR. F. C. KIDNER, Instructor in Orthopedics, Univ. of Mich., Detroit, Mich.
DR. J. R. McCORD, Prof. Obst. & Gyn., Emory Univ., Atlanta, Ga.
DR. JOHN A. KILLIAN, New York, N. Y.
DR. ABRAHAM LEVINSON, Ass't. Prof. Ped., Northwestern Univ., Chicago, Ill.
DR. SAMUEL A. LEVINE, Ass't. Prof. Med., Harvard Univ., Boston, Mass.
DR. NORMAN BETHUNE, Chief of Div. Thoracic Surg. & Bronchoscopy, Sacred Heart Hospital, Montreal, Canada
DR. FREDERICK A. COLLER, Prof. Surg., Univ. of Mich., Ann Arbor, Mich.

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DR. A. F. COOPER, SECRETARY-TREASURER

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Continued from page 220

Dr. Lewis D. Hoppe, Jr., Atlanta, has been made President of the Fulton County Pediatric Society.

Dr. Archie P. Evans, Macon, has been assigned to duty in the Medical Corps of the Civilian Conservation Camp at Camp Beauregard, Tioga, Louisiana.

Dr. Hal M. Davison and Dr. Thomas C. Davison, Atlanta, were guest speakers before the Greenville County Medical Society, Greenville, South Carolina, recently.

Dr. W. R. McCoy, formerly of Folkston, has moved to Alma.

Dr. Harry Eugene Teasley, Hartwell, and Miss Nancy Dorothy Massey were married December 25.

Dr. Wyman Platte Sloan, Atlanta, and Mrs. Helen Harris Sloan were married recently.

Dr. Willis Tuggle McCurdy, Stone Mountain, and Miss Elsie Hamilton were married recently.

Dr. Frank Kimzey Justice, Clayton, and Miss Katherine S. Miller were married October 19.

Dr. William E. Elkin, Atlanta, and Miss Nell Osborne were married October 22.

Dr. Charles H. Farmer and Mrs. Eugenia Spivey, both of Macon, were married recently.

DEATHS

Dr. Guy Leslie Austin, Pavo, aged 56, died December 11 of heart disease.

Dr. John Drewery Mangham, Alamo, aged 32, died November 30.

Dr. J. O. Kelley, Avera, aged 54, died October 30.

Dr. Samuel Melvin Harpe, Calhoun, aged 72 died recently.

Dr. Edward Y. Walter, Eatonton, aged 78, died November 5 of arteriosclerosis and hemiplegia.

Dr. John T. Wages, Macon, aged 59, died recently.

Dr. Henry Marshall Fullilove, Athens, aged 58, died November 17 of pneumonia.

Dr. John W. Field, Atlanta, aged 72, died December 4.

Dr. Alexander Stuart Matheson Coleman, Douglas, aged 45, died November 15.

Dr. William Robert Lovett, Sylvania, aged 73, died November 11 of heart disease.

Dr. Richard L. King, Hulett, aged 65, died recently.

Dr. James Henry McDuffie, Columbus, aged 76, died November 16.

Dr. Willis F. Westmoreland, Atlanta, aged 71, died December 4.

Dr. Joseph G. Edie, Nashville, aged 82, died November 18.

Dr. Iverson Clark Case, Atlanta, aged 51, died November 25.

Dr. John H. Powell, Atlanta, aged 66, died November 16.

KENTUCKY

The Carlisle County Medical Society elected the following officers for the coming year: Dr. E. E. Smith, Bardwell, President; Dr. R. C. Burrow, Cunningham, Vice-President; Dr. J. F. Dunn, Arlington, Secretary-Treasurer.

The Jefferson County Medical Society had as guest speaker at its meeting on December 2 Dr. Esmond R. Long, Philadelphia, Pennsylvania.

Dr. Edward O. Guerrant, Winchester, and Miss Julia Bullard were married recently.

DEATHS

Dr. William L. McGavic, Cave City, aged 92, died recently.

LOUISIANA

The Ouachita Parish Medical Society elected the following officers for the coming year: Dr. J. H. Pankey, Monroe, President; Dr. C. U. Johnson, Monroe, Vice-President; Dr. Ralph J. Talbot, Monroe, Secretary-Treasurer.

The St. Tammany Parish Medical Society elected the following officers for the coming year: Dr. J. F. Polk, Slidell, President; Dr. H. D. Bulloch, Covington, Vice-President; Dr. F. R. Singleton, Slidell, Secretary-Treasurer.

The Allen Parish Medical Society elected the following officers for the coming year: Dr. A. D. Mangham, Elizabeth, President; Dr. Lofton F. Gray, Oakdale, Vice-President; Dr. F. W. Heath, Oakdale, Secretary-Treasurer.

The Bi-Parish Medical Society elected the following officers for the coming year: Dr. J. J. Ayo, Raceland, President; Dr. A. S. Tombs, Jr., New Orleans, Vice-President; Dr. E. M. Toler, Clinton, Secretary-Treasurer.

The Claiborne Parish Medical Society elected the following officers for the coming year: Dr. F. Palmer, Homer, Presi-

Continued on page 28

DOCTOR, OUR PLANS ARE COMPLETE IN EVERY DETAIL

We feel the most comprehensive and thorough program yet presented is ours—fashioned to *your* desires as expressed in returned Questionnaires.

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Dr. Francis G. Blake, New Haven—Medicine.
Dr. Alan Brown, Toronto—Pediatrics.
Dr. Louis A. Buie, Rochester—Proctology.
Dr. W. R. Cubbins, Chicago—Orthopedics.
Dr. C. F. Fluhmann, San Francisco — Gynecology.
Dr. Verne C. Hunt, Los Angeles—Surgery.
Dr. Foster Kennedy, New York City — Neurology.
Dr. B. R. Kirklin, Rochester—Roentgenology.
Dr. John A. Kolmer, Philadelphia—Medicine.
Dr. W. A. Wells, Washington—Otolaryngology.

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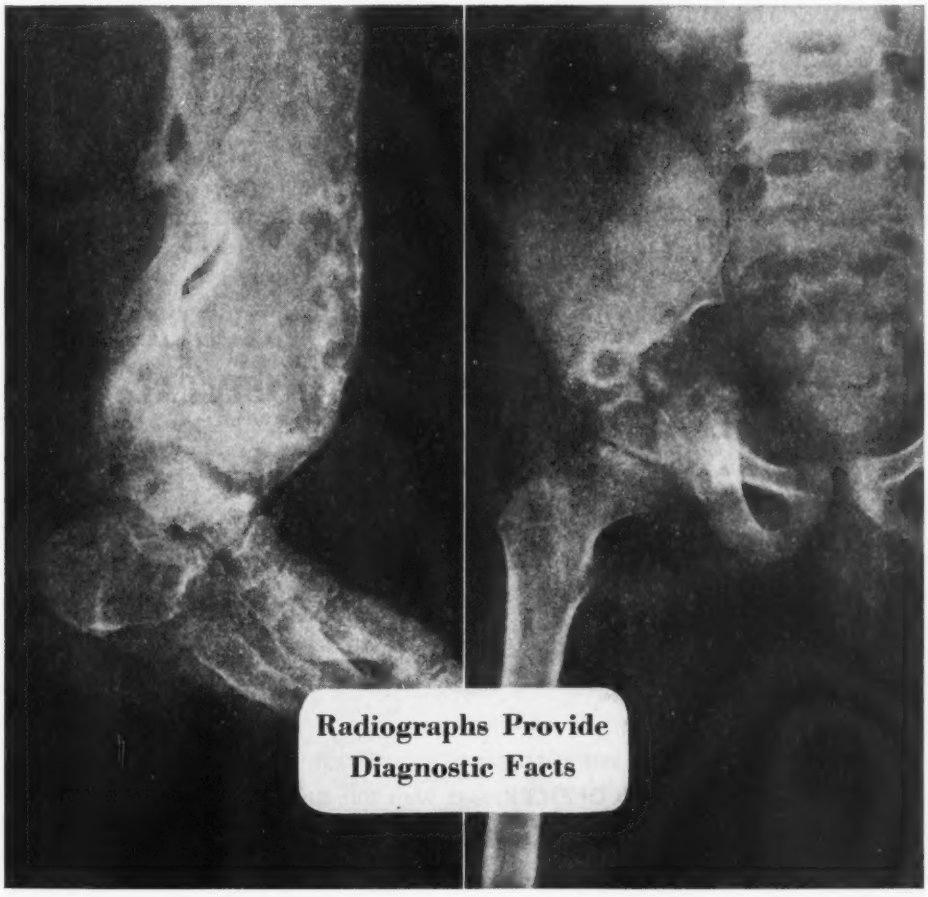

Continued from page 26

dent; Dr. J. E. Batchelor, Haynesville, Vice-President; Dr. H. R. Marlatt, Homer, Secretary-Treasurer.

Dr. Paul T. Thibodaux, Donaldsonville, has been appointed Health Officer of that city.

Dr. John T. Sanders, New Orleans, was a guest speaker before the Harris County Medical Society in Houston, Texas, recently.

Dr. John H. Musser, New Orleans, was a recent lecturer at the University of Alabama School of Medicine, University, Alabama.

Dr. H. W. Kostmayer, New Orleans, was a guest speaker before the Tri-County Medical Society in Brookhaven, Mississippi, on December 10.

Dr. L. Roland Young, Covington, is taking postgraduate work in New York.

MARYLAND

The Baltimore City Medical Society has elected the following officers for the coming year: Dr. Charles C. W. Judd, President; Dr. Robert P. Bay, Vice-President; Dr. Frank J. Geraghty, Secretary; Dr. J. Albert Chatard, Treasurer; Dr. Dean Lewis, Honor Committee. The retiring President, Dr. Frank S. Lynn, was elected to the Board of Censors.

Dr. Charles C. W. Judd, President of the Baltimore City Medical Society, has announced the appointment of Dr. Sidney R. Miller, Baltimore, as General Chairman of the local Committee on Arrangements for the Southern Medical Association meeting in Baltimore, November 17-20.

Dr. John Mason Hundley, Jr., Baltimore, formerly Associate in Gynecology at the University of Maryland School of Medicine, has been made Professor of Clinical Gynecology.

Dr. James Dawson Reeder, Baltimore, formerly Clinical Professor of Diseases of the Colon and Rectum, University of Maryland School of Medicine, has been made Professor.

Dr. Harry Garland Timbres, Baltimore, has been made Assistant in Biostatistics at Johns Hopkins University School of Hygiene and Public Health.

Dr. John A. Skladowsky, Baltimore, has been made full-time Medical Health Officer of the Baltimore Health Department.

Dr. Charles R. Austrian, Baltimore, was a guest speaker before the Virginia Peninsula Academy of Medicine November 18.

Dr. Charles Summers Stevenson, Baltimore, and Miss Alice de Guildry Stevens were married recently.

DEATHS

Dr. C. Frank Maguire, Upper Marlboro, aged 74, died November 24 of intestinal obstruction.

Dr. Harry C. Chappelier, Hughesville, aged 62, died December 8 of bronchopneumonia and empyema of the gallbladder.

Dr. Eugene Florencio Raphel, Cumberland, aged 57, died recently of cirrhosis of the liver.

Dr. Charles Harrison Dixon, Moberly, aged 67, died November 8 from injuries received in an automobile accident.

Dr. George Francis Whitaker, Baltimore, aged 48, died November 23 of arteriosclerotic heart disease.

Dr. Samuel Mitchell Wagaman, Hagerstown, aged 62, died November 8 of heart disease.

MISSISSIPPI

The Tri-County Medical Society had as guest speaker at its meeting on December 10 Dr. H. W. Kostmayer, New Orleans, Louisiana.

Dr. Presley E. Werlein, formerly of Biloxi, has moved to Houston, Texas.

Dr. A. B. Jemison, formerly of Morrilton, has moved to Biloxi.

DEATHS

Dr. Joseph Charles Buckley, Bay St. Louis, aged 47, died recently of cerebral hemorrhage.

MISSOURI

The Bates County Medical Society elected the following officers for the coming year: Dr. Charles A. Lust, Sr., Butler, President; Dr. A. Graham Wooldridge, Butler, Secretary-Treasurer.

The Jasper County Medical Society elected the following officers for the coming year: Dr. O. T. Blanke, Joplin, President; Dr. Paul Walker, Joplin, Vice-President; Dr. J. W. Hardy, Joplin, Secretary; Dr. H. D. McGaughey, Joplin, Treasurer.

Dr. Peter T. Bohan and Dr. Charles C. Dennie, Kansas City,

Continued on page 30

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Continued from page 28

were guest speakers before the Muskogee Academy of Medicine, Muskogee, Oklahoma, at its meeting on December 4.

Dr. R. H. Klemme, St. Louis, was a speaker before the Craighead-Poinsett County Medical Society at its meeting in Jonesboro, Arkansas, on December 12.

Dr. J. Curtis Lyter, St. Louis, was a guest speaker before the Randolph County Medical Society at its meeting in Chester, Illinois, recently.

The Jackson County Medical Society had as guest speaker at its meeting on November 19 Dr. Walter Freeman, Washington, D. C.

DEATHS

Dr. Norvel William Jarvis, Festus, aged 55, died recently of cerebral hemorrhage.

Dr. Emmett Pipkin North, St. Louis, aged 59, died December 28.

Dr. Eugene Robert Van Meter, Springfield, aged 52, died recently of fat embolism following a fracture of both legs.

Dr. John Floyd Koogler, Kansas City, aged 63, died November 11 of coronary occlusion.

Dr. Cyril Preston Vores, Unionville, aged 62, died December 2 of carcinoma of the stomach.

Dr. Clyde M. Balsley, Joplin, aged 46, died November 12 of a heart attack.

NORTH CAROLINA

The Third District Medical Society has elected the following officers for the coming year: Dr. Ernest S. Bulluck, Wilmington, President; Dr. J. N. Dawson, Bolton, Vice-President; Dr. F. O. Fay, Wilmington, Secretary-Treasurer.

The Edgecombe-Nash County Medical Society has elected the following officers for the coming year: Dr. J. H. Cutchin, Whitakers, President; Dr. A. C. Norfleet, Tarboro, First Vice-President; Dr. W. O. House, Tarboro, Second Vice-President; Dr. A. L. Daughtridge, Rocky Mount, Secretary-Treasurer.

The Rutherford County Medical Society has elected the following officers for the coming year: Dr. W. H. Knight, Bostic, President; Dr. R. H. Hardin, Rutherfordton, Vice-President; Dr. C. F. Glenn, Rutherfordton, Secretary-Treasurer.

The Wilson County Medical Society has elected the following officers for the coming year: Dr. M. P. Mullen, Wilson, President; Dr. R. H. Putney, Elm City, Vice-President; Dr. E. T. Clark, Secretary-Treasurer.

The Wayne County Medical Society has elected the following officers for the coming year: Dr. D. J. Rose, Goldsboro, President; Dr. Luby Warrick, Goldsboro, Vice-President; Dr. Jack Harrell, Goldsboro, Secretary-Treasurer.

The Seventh District Medical Society elected the following officers for the coming year: Dr. J. M. Davis, Wadesboro, President; Dr. McT. G. Anders, Gastonia, Vice-President; Dr. C. H. Pugh, Gastonia, Secretary.

The Pitt County Medical Society elected the following officers for the coming year: Dr. S. M. Crisp, Greenville, President; Dr. W. M. B. Brown, Greenville, Vice-President; Dr. W. K. McDowell, Greenville, Secretary-Treasurer.

The Seaboard Medical Association elected Dr. Spencer P. Bass, Tarboro, President for the coming year.

Dr. C. J. Helsabeck, Walnut Cove, now has associated with him Dr. G. Fletcher Reeves, formerly Wayne County Health Officer.

The Guilford County Medical Society had as guest speaker at a recent meeting Dr. J. Shelton Horsley, Richmond, Virginia.

Dr. Paul Enos Hedrick, Lenoir, and Miss Waldine Perry were married recently.

Dr. William H. McCarthy, Marion, and Miss Sallie Cynthia Holmes were married November 26.

Dr. C. B. Yount, Hickory, and Mrs. Lydia Conley Bissette were married November 27.

Dr. Clarence Lee Guyton, Jr., Monroe, and Miss Jennie Llewellyn Finlayson were married recently.

Dr. Frank Trumbo Harper, Jamestown, and Miss Gladys Virginia Duval were married recently.

Dr. Clarence Hunt White, Burnsville, and Miss Mary Young Hunt were married October 24.

Dr. Paul Jones Chambers and Miss Mary Ellen Watts, both of Charlotte, were married recently.

Dr. William Elledge Selby, Charlotte, and Miss Sarah Elizabeth Norwood were married October 17.

Dr. Robert Lindsay McMillan and Miss Mozelle Wilkinson, both of Durham, were married in November.

DEATHS

Dr. Daniel Thompson Boger, Monroe, aged 67, died December 2.

Continued on page 32

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R. B. H. GRADWOHL, M.D., Director

Continued from page 30

Dr. Julian Meredith Baker, Tarboro, aged 77, died recently of coronary thrombosis.

Dr. James Donald Baird, Barnardsville, aged 48, died October 10 of acute perforative appendicitis.

Dr. Benjamin W. Brown, Charlotte, aged 74, died October 25 of carcinoma of the prostate.

Dr. William Roffin Goley, Shallotte, aged 58, died November 12 of angina pectoris and edema of the glottis.

Dr. William Burdette Chapin, Pittsboro, aged 52, died November 6 of carcinoma of the liver.

Dr. Humphrey H. Hall, Winston-Salem, aged 69, died November 9 from injuries received in an automobile accident.

Dr. James McKnight Hunter, Millers Creek, aged 70, died November 26 of carcinoma.

Dr. A. R. Hodge, Severn, aged 35, died recently of pneumonia.

Dr. Arthur Ogburn Spoon, Greensboro, aged 54, died November 19 of influenza and pneumonia.

Dr. Parran Jarboe, Greensboro, aged 50, died December 29 from injuries received in an automobile accident.

OKLAHOMA

Dr. Lewis J. Moorman, Oklahoma City, has been named to Oklahoma's Hall of Fame by the Oklahoma Memorial Association in recognition of his achievements in medicine.

Dr. Egil T. Olsen, formerly of Detroit, has been appointed Medical Director and Assistant Superintendent of State University Hospital, Oklahoma City.

Dr. J. D. Shipp, Tulsa, announces his association with Dr. H. W. Ford, Natural Gas Building, Tulsa.

Dr. A. B. Stephens, Seminole, has returned after taking postgraduate work at the Mayo Clinic.

Dr. I. V. Hardy, Medford, has returned after attending clinics in Rochester, Minnesota.

Dr. Ralph V Smith, formerly of Tulsa, has moved to Salina.

DEATHS

Dr. Marion Mansfield Roland, Oklahoma City, aged 53, died December 1 of coronary thrombosis.

Continued on page 34

ACID RESISTANCE WITH KALAK

Hypertonic — Alkaline — Carbonated — Not Laxative

The years of experience with physicians who have used Kalak show that the use of a formula containing calcium, magnesium, sodium and potassium salts represents a correctly balanced solution. This is Kalak which, as such, aids in maintaining a balanced base reserve.

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Continued from page 32

Dr. William Alexander Thomson Robertson, Ponca City, aged 66, died recently.

SOUTH CAROLINA

The Greenville County Medical Society had as guest speaker at a recent meeting Dr. Hal M. Davison and Dr. Thomas C. Davison, Atlanta, Georgia.

Dr. C. Howard Cain, formerly of Orange, Virginia, has moved to Conway.

Dr. Orlando Benedict Mayer and Miss Nancy Phillips, both of Columbia, were married recently.

Dr. Robert H. Crow, Woodruff, and Miss Juanita Gregory were married November 4.

Deaths

Dr. Walter S. Eubanks, Greenwood, aged 66, died December 6 of pneumonia.

TENNESSEE

The Middle Tennessee Medical Association elected the following officers for the coming year: Dr. Joe B. Wright, Lynnville, President; Dr. J. C. Pennington, Nashville, Vice-President; Dr. Daugh W. Smith, Nashville, Secretary-Treasurer.

The Madison County Medical Society elected the following officers for the coming year: Dr. J. C. Pearce, Mercer, President; Dr. J. E. Powers, Jackson, Vice-President; Dr. S. M. Herron, Jackson, Secretary.

The Dyer, Lake and Crockett Counties Medical Society elected the following officers for the coming year: Dr. C. R. Newkirk, Tiptonville, President; Dr. C. L. Denton, Dyersburg, Secretary-Treasurer.

Dr. B. F. Turner, Memphis, was a guest speaker before the Craighead-Poinsett County Medical Society in Jonesboro, Arkansas, on December 12.

Dr. William Huston Tanksley, Jr., Nashville, and Miss Billie Barringer were married recently.

Dr. Henry Tompkins Kirby-Smith, Sewanee, and Miss Mary Phillips Woolverton were married recently.

Deaths

Dr. John P. Grisard, Winchester, aged 57, died November 26.

Dr. Daniel W. Bradfield, Wildersville, aged 84, died recently of bronchopneumonia.

Dr. George Plato Bingham, Bluff City, aged 57, died October 11.

TEXAS

The Texas Association of Obstetricians and Gynecologists elected the following officers for the coming year: Dr. J. L. Jinkins, Galveston, President; Dr. Herman W. Johnson, Houston, President-Elect; Dr. Luther Parker, Wichita Falls, Vice-President; Dr. Minnie L. Maffett, Dallas, Secretary-Treasurer.

Dr. Frank Selecman and Dr. Penn Riddle, Dallas, Dr. H. D. Prichard, Wichita Falls, and Dr. S. D. Coleman, Navasota, have been extended Fellowships in the American College of Surgeons.

Dr. R. H. Bell, Columbus, has been made local surgeon for the Southern Pacific Lines.

Dr. C. F. Crain, Corpus Christi, has been elected Chief of Staff of the Spohn Hospital.

Dr. A. A. Chapman, Sweetwater, has been made President of the Nolan County Tuberculosis Association.

Dr. O. T. Arnold, Laredo, has taken charge of the United States Public Health Service of Laredo, succeeding the late Dr. Nat K. King.

Dr. J. J. Cappleman, Honey Grove, was recently made local surgeon for the Texas and Pacific Railway.

The Postgraduate Medical Assembly of South Texas met in Houston December 3-5.

Dr. Edmond H. Sauvignet, Laredo, has been made Health Officer of Webb County.

Dr. Laurence J. Montague, Edinburg, has been made Superintendent of City-County Hospital.

The Harris County Medical Society had as guest speaker at a recent meeting Dr. John T. Sanders, New Orleans, Louisiana.

Dr. G. G. Brandau has moved from Houston to Monahans.

Dr. C. J. Carter has moved from Longview to Hobbs, New Mexico.

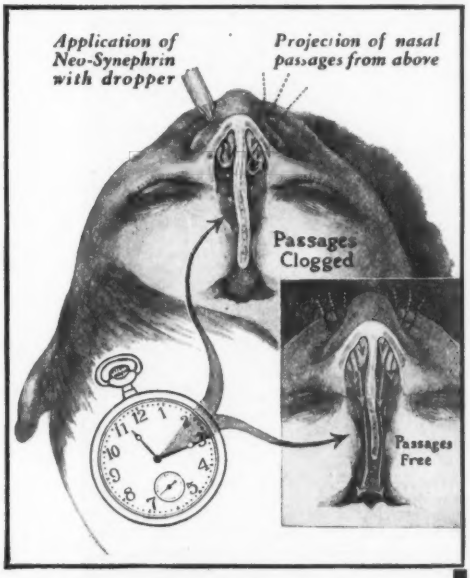
Dr. A. M. Gantt has moved from Beaumont to Baytown.

Dr. F. D. Garrett has moved from Boerne to St. Petersburg, Florida.

Continued on page 36

NASAL CONGESTION

FREER BREATHING



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Continued from page 34

Dr. George A. Gray has moved from Abilene to Memphis, Tennessee.

Dr. Gerald A. King has moved from Flatonia to Cuero.

Dr. Gordon Phillips has moved from Wichita Falls to Henrietta.

Dr. W. S. Rhode has moved from San Antonio to Kansas City, Missouri.

Dr. J. E. Sherman has moved from El Paso to Defiance, Ohio.

Dr. W. Grady Shytles has moved from Abilene to Snyder.

Dr. Cora V. Wells has moved from Rogers to Fort Worth.

Dr. L. M. Whitsitt has moved from Fort Worth to Dallas.

Dr. R. B. Wolford has moved from Karnack to Paris.

Dr. William Jenkins Woolsey, Waco, and Miss Helen Roberta Henry were married November 21.

Deaths

Dr. Walter Valentine Spencer, Logan, aged 60, died November 4 of coronary thrombosis.

Dr. Thomas McKendrie Young, Chillicothe, aged 77, died recently of cerebral hemorrhage.

Dr. Harry Edgar Braun, Houston, aged 55, died November 9 of coronary occlusion.

Dr. John L. Sears, El Paso, aged 48, died recently of streptococcic infection, otitis media and mastoditis.

Dr. Pierre Francis Higgins, Fort Worth, aged 47, died October 9.

Dr. Charles Alden Cole, Winnie, aged 81, died October 14 following a stroke of paralysis.

Dr. Samuel B. Miller, Fort Worth, aged 55, died October 31 of coronary occlusion.

Dr. George M. Whitley, Honey Grove, aged 67, died October 21 of cardiovascular disease.

VIRGINIA

The Hanover County Medical Society has elected the following officers for the coming year: Dr. A. E. Murray, Beaver Dam, President; Dr. J. Thompson Booth, Ashland, Vice-President; Dr. J. Alexander Wright, Doswell, Secretary-Treasurer.

The Danville-Pittsylvania Academy of Medicine elected the

Continued on page 38

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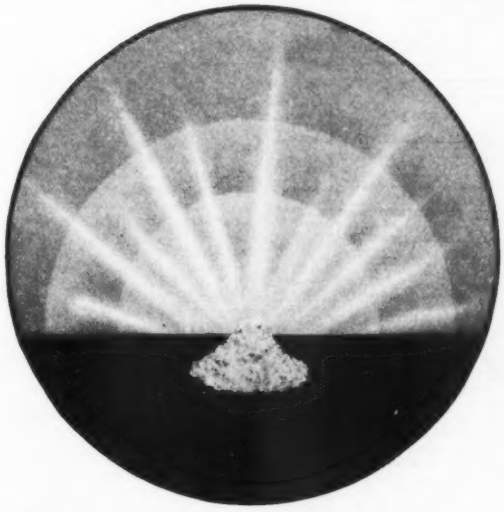

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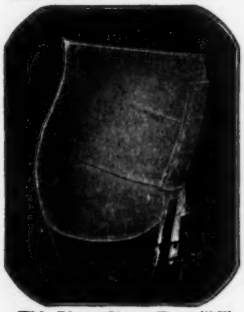

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Continued from page 36

following officers for the coming year: Dr. H. A. Wiseman, Danville, President; Dr. E. B. Robertson and Dr. I. C. Harrison, Danville, Vice-Presidents; Dr. P. W. Miles, Danville, Secretary-Treasurer.

The Lynchburg Academy of Medicine elected the following officers for the coming year: Dr. J. Henry Rawlings, Lynchburg, President; Dr. John Wyatt Davis, Lynchburg, Vice-President.

The Arlington County Medical Society elected the following officers for the coming year: Dr. J. H. Walton, Cherrydale, President; Dr. J. E. Payne, Clarendon, Vice-President; Dr. Robert H. Detwiler, Clarendon, Secretary-Treasurer.

The Culpeper County Medical Society elected the following officers for the coming year: Dr. David S. Kelly, Jr., Culpeper, President; Dr. John E. Parks, Jr., Brandy, Vice-President; Dr. Otway K. Burnette, Culpeper, Secretary.

The Virginia Peninsula Academy of Medicine was addressed recently by Dr. Charles R. Austrian, Johns Hopkins Medical School, Baltimore, Maryland.

Dr. R. L. Mason, Roanoke, has been made Surgeon-in-Chief to the Sons of Confederate Veterans.

Dr. Beverley R. Tucker, Richmond, has been elected First Vice-President of the Seaboard Airline Railway Surgeons.

Dr. James I. Hamner, Mannboro, has been made Chairman of the Democratic Committee of Amelia County.

Dr. J. H. Smoot, New Market, has been elected President of the Shenandoah County Fair Association.

Dr. R. L. Page, Batesville, has been made Chaplain of the King Solomon's Lodge of Yancey's Mill.

Dr. Fred P. Fletcher, Richmond, has been made one of the Vice-Presidents of the Richmond Council of Social Agencies.

Dr. J. E. Tilman, Powhatan, has been made President of the Powhatan Club.

The Southern Surgical Association met in Hot Springs December 10, 11, 12.

The Norfolk County Medical Society had as guest speaker at its meeting on December 2 Dr. Ross Garrett, Washington, D. C.

Dr. J. Shelton Horsley, Richmond, was a guest speaker before the Guilford County Medical Society at High Point, North Carolina, recently.

Continued on page 40

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A standardized preparation of the ovarian follicular hormone for intensive ovarian therapy by hypodermic injection.

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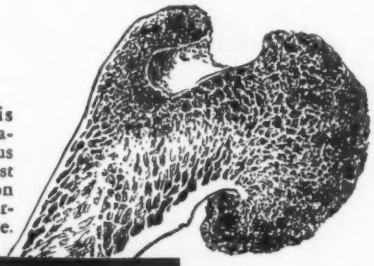

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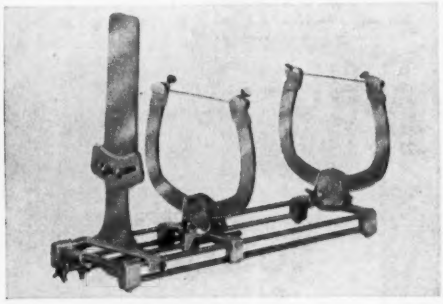

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Continued from page 38

Dr. Julian L. Rawls, Norfolk, has been made President of the Norfolk-Portsmouth Chapter of the Richmond College Alumni Chapter.

Dr. Howard Russell Masters, Richmond, has been made a Fellow of the American Psychiatric Association.

Dr. W. P. Hoy, Petersburg, was recently made a member of the Board of Directors of the Petersburg Rotary Club.

Dr. C. Howard Cain, formerly of Orange, has moved to Conway, South Carolina.

Dr. L. E. Hayes, formerly of Covington, has moved to Roanoke and opened offices in the Shenandoah Life Building.

Dr. W. E. Dickerson, formerly of Welch, West Virginia, has located in the Masonic Temple, Danville.

Dr. W. L. Griggs, formerly of Baltimore, Maryland, has moved to St. Charles.

Dr. B. B. McCluer, formerly of Rockbridge Baths, has moved to Powhatan.

Dr. Walter McMann, formerly of Richmond, has moved to Danville.

Dr. Paul Q. Daniel, formerly of Richmond, has moved to Big Rock.

Dr. L. Floyd Hobbs, Jewell Ridge, and Miss Catherine Jones were married November 30.

Dr. Henry Bernard Showalter, Kenbridge, and Miss Edna Elizabeth Kiely were married December 19.

Dr. Paul Douglas Camp, Richmond, and Miss Nellie Cornelia Staves were married December 7.

Dr. William H. McCarty and Miss Sallie Cynthia Holmes, both of Marion, were married November 26.

Dr. Angus Hinson and Miss Johnie Lea Black, both of Chase City, were married recently.

Dr. William Durwood Suggs and Miss Grace Lorraine, both of Richmond, were married November 2.

Dr. Jethro Meriwether Hurt and Miss Margaret Virginia Bennett, both of Blackstone, were married November 6.

Dr. William Crossman, Jr., Richmond, and Miss Virginia Cox were married November 3.

Dr. Thomas Stanley Meade and Miss Mary Belle Long, both of Richmond, were married November 7.

Deaths

Dr. Charles Shepherd Webb, Bowling Green, aged 89, died November 28.

Dr. Robert L. Kern, Richmond, aged 64, died December 24.

Dr. Henry B. Pack, Blacksburg, aged 57, died December 2.

Dr. John Arnold Board, Altavista, aged 44, died December 18.

Dr. William P. Parrish, Chatham, aged 69, died December 6.

Dr. John Coleman Everett, Albemarle, aged 73, died December 4.

Dr. Edward Chisholm Cobb, Ruther Glen, aged 59, died December 14.

WEST VIRGINIA

The Logan County Medical Society elected the following officers for the coming year: Dr. V. A. Deason, Logan, President; Dr. D. T. Moore, Stirrat, Secretary-Treasurer.

The McDowell County Medical Society elected the following officers for the coming year: Dr. E. E. Vermillion, Welch, President; Dr. C. F. Johnston, Welch, Vice-President; Dr. R. H. Edwards, Welch, Secretary; Dr. F. E. LaPrade, Welch, Treasurer.

The Kanawha County Medical Society elected the following officers for the coming year: Dr. Ray Kessel, Charleston, President; Dr. A. W. Milhoan, Nitro, Vice-President; Dr. P. A. Haley, II, Charleston, Secretary-Treasurer.

The Harrison County Medical Society elected the following officers for the coming year: Dr. R. B. Linger, Clarksburg, President; Dr. J. S. Maloy, Shinnston, Secretary; Dr. Creed C. Greer, Clarksburg, Treasurer.

Dr. Walter E. Vest, Huntington, has been elected President of the Cabell County Medical Society.

Dr. George Louis Jones, Killarney, and Miss Ruth Margaret Wilson were married December 14.

Dr. John Gordon Bell, Hinton, and Miss Anna Lee Paschall were married November 30.

Dr. Rodolph Fowlkes, Welch, and Miss Rinda Elizabeth Gay were married December 11.

Deaths

Dr. Joseph Lelsie Pyle, Chester, aged 68, died October 23 of heart disease.

Dr. Horace Clinton Whisler, Smithfield, aged 76, died October 14 of heart disease.

Dr. William Wade Morton, Bluefield, aged 83, died in December.

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Continued down from 1911

1934

In fermentative diarrhea, "Sugar is usually added beginning at one per cent. or dextrimaltose may be used and later barley gruel may take the place of the plain water."—*J. Ruhrah: The acute diarrheas of early life, in F. Tice: Practice of Medicine, vol. 7, W. F. Prior Co., Hagerstown, Md., 1934, p. 708.*

1934

"In many infants, milk sugar acts as a laxative, but unless the laxative effect is desirable, it has no advantages. Maltose and dextrin compounds are of practical value when large amounts of cane or milk sugar are not well taken. Because of their varying maltose, dextrin, and alkali content, some compounds are constipating and others are laxative. This must be given due consideration in their selection."—*J. H. Hess and H. G. Poncher: Direct and indirect artificial irradiation in the care of children, in Principles and Practice of Physical Therapy (edited by R. Pemberton), W. F. Prior Co., Inc., Hagerstown, Md., 1934, vol. 1, Chapter 11, p. 19.*

1934

"Whole lactic acid milk, with the addition of 1 ounce (by weight) of dextrimaltose to 10 ounces of milk, is a serviceable formula for premature infants."—*N. B. Capon: The newly born baby, in Diseases of Children (edited by A. E. Garrod, F. E. Batten, H. Thursfield and D. Paterson), ed. 3, William Wood & Co., Baltimore, 1934, p. 105.*

1934

In acute infective diarrhea, "Sugar is less easily dealt with, although an unfermentable sugar, such as maltose, is preferable to dextrose or lactose from this point of view."—*R. Miller: Diseases of the intestinal tract, in Diseases of Children (edited by A. E. Garrod, F. E. Batten, H. Thursfield and D. Paterson), ed. 3, William Wood & Co., Baltimore, 1934, p. 228.*

1935

"We do not feed breast milk at all to the babies of toxemic mothers, tuberculous mothers, mothers with heart complications, and such types. They are fed a formula because the babies, within a short time, will have to be accustomed to a formula. There has been no greater death rate among the formula-fed babies than there has been among the breast-fed babies. When we know that a baby of a toxic mother will eventually get on to the breast, it is fed on fortified breast milk, with 2 to 3 per cent of carbohydrate in the form of dextrimaltose, dextrin, etc., added."—*E. W. May: Round table discussion on prematurity, J. Pediat. 6:118, Jan. 1935.*

1935

"If the stools are acid, green, and excoriating, a food high in protein and low in fat, and carbohydrate is indicated. Dried powdered protein milk is very ideal here—one to ten dilution. On the other hand, if the evacuations are brown, watery, and stinking with putrefactive odors, a proteolytic diarrhea, it will be of advantage to add a small amount of carbohydrate, a dextrimaltose preparation being very efficacious."—*A. G. Dow: Diarrheas in infants, Nebraska M. J. 20:22-24, Jan. 1935.*

1935

"Pure dextrimaltose sugars are nonanaphylactogenic."—*B. Ratner and A. H. Gruehl: Anaphylactogenic properties of malted sugars and corn syrup, Am. J. Dis. Child 49:307-317, Feb. 1935.*

1935

In sugar indigestion, "To correct this it is only necessary to withhold all sugars and starches for a few days until the fermentation and acid stools disappear. A normal amount of sugar may be gradually added up to the point of tolerance. Malt sugar, for reasons already laid down, is preferable."

"Pure maltose is hard to obtain and the expense precludes its general use. When malt sugar is mentioned a combination of maltose and dextrins is always meant. There are many different brands, each having a different proportion of maltose and dextrins. The dextrins are higher sugars (polysaccharides) and are digested into the disaccharides or maltose, which are eventually split up into dextrose. Some of the chief advantages of dextri-maltose are due to the dextrins. They are not broken down in the stomach. In the intestinal tract they have so many stages of digestion that no great amount of sugar is formed at any one time, thus giving more time for absorption. A higher proportion of malt sugar can be used than of any other sugar, even 10 per cent to 12 per cent. If vomiting should be induced, the intestinal tract is not usually irritated and the higher proportions may be reduced without any lasting disturbance. They are especially useful in feeding infants recovering from intestinal upsets, as they can be used when other sugars seem to disturb."—*J. B. Cowherd: Infant feeding, in Methods of Treatment (by L. Clendening), ed. 5, C. V. Mosby Co., St. Louis, 1935, pp. 356, 365.*

1935

In dyspepsia, "The buttermilk (freshly prepared or cultured) is best given immediately with 3 to 5 per cent dextrimaltose and 3 per cent flour (corn, potato, rice, or wheat)."

"The lactic acid whole milk has an excellent effect on mildly dystrophic infants and has been proven a calory-rich therapeutic food. To 100 Gm. whole milk is added 2 Gm. fine maize flour, 6 Gm. dextri-maltose and 6 per cent lactic acid =97 calories."—*E. Rominger: The nutritional disturbances of infants, in The Diseases of Children (by M. Pfaundler and A. Schlossmann, English translation) J. B. Lippincott Co., Phila., 1935, vol. 4, pp. 102, 187.*

1935

In the treatment of dysentery, "As a useful supplement, Bessau's thick rice water with 1 to 5 per cent dextrimaltose may be used, or soy bean milk, which also may serve as main nourishment in the rare cases of hypersensitiveness to cow's milk."—*O. Willner: Dysentery, in The Practitioner's Library of Medicine & Surgery, D. Appleton-Century Co., New York, 1935, vol. 7, p. 371.*

1935

In celiac disease, "Certain carbohydrates have been found to supply the caloric needs without producing the foamy stools occasionally seen when starch is given. They are ripe bananas, glucose and dextrimaltose."

"During the periods of severe diarrhea and vomiting the diet may have to be limited to skimmed milk, glucose, dextrimaltose and fruit juices."—*D. C. Darrow: Steatorrhea, in The Practitioner's Library of Medicine & Surgery, D. Appleton-Century Co., New York, 1935, vol. 7, p. 390.*

(to be continued)

When More Physicians Specify MEAD'S, More Babies Will Be Fed By Medical Men

It is interesting to note that a fair average of the length of time that an infant receives Dextri-Maltose is five months: That these five months are the most critical of the baby's life: That the difference in cost to the mother between Dextri-Maltose and the very cheapest carbohydrate at most is only $6 for this entire period—a few cents a day: That, in the end, it costs the mother less to employ regular medical attendance for her baby than to attempt to do her own feeding, which in numerous cases leads to a seriously sick baby eventually requiring the most costly medical attendance.

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